SPECIAL COLLECTOR'S EDITION

SCIENTIFIC AMERICAN

THE SCIENCE OF

OVERCOMING RACISM

What research shows and experts say about creating a more just and equitable world

INSIDE

Proven Ways to Reduce Bias • Agents of Change
How to Fix Toxic Policing • Racism and COVID-19
Why Diversity Really Matters

SUMMER 2021

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FROM THE EDITOR

The Case for Antiracism

In the year since a Minneapolis police officer kneeled on George Floyd's neck for more than nine minutes and stopped the man's heart, a record number of protesters have taken to the streets around the world to demand change. Earlier this year a jury took the all too extraordinary step of convicting the officer of murder. But the incessant killing of Black people and "the devaluation of Black lives in all domains of American life," as sociologist Aldon Morris writes (*page 4*), continue to power the Black Lives Matter movement, which was launched in 2013 after the acquittal of Trayvon Martin's killer in Florida.

It is an unequivocal scientific fact that race is a social construct, not a biological one. The implicit prejudices and biases we carry against those unlike us are real (*page 32*), but society instills them in our subconscious mind, and they are therefore malleable (*page 34* and *page 36*).

Discrimination oppresses and disenfranchises people everywhere. Misattributing blame for racist systems and practices to its victims constitutes a kind of institutional-level gaslighting that enforces white supremacy (*page 50*). In everyday interactions, those with privilege and power subtly insult those in the "out-group" through microaggressions that reinforce their power structure and inflict psychological harm (*page 48*). Even the way people talk about certain scientific fields keeps women and minority groups excluded from academia and related professions (*page 54*). And despite institutional efforts to increase diversity and inclusion, science is plagued by discrimination and loss of minority talent (*page 46*).

"RESURRECTION CITY" on the National Mall in 1968 was a live-in protest settlement.

Public health expert Camara Phyllis Jones explains on page 72 why such institutional racism, not race, has made people of color more than twice as likely to die from COVID-19. And irrespective of the global pandemic, Black children and other minorities are disproportionately born into poverty and thus incur more health risks throughout their lives (*page 64*). Black mothers suffer higher rates of maternal mortality, and doctors and algorithms often overlook or discount medical symptoms experienced by Black people (*page 84*).

In the wake of Floyd's murder, civil rights expert Alexis J. Hoag recounted to *Scientific American* the violent, racist history that brought U.S. society to a breaking point (*page 86*)—one where Black people are about three times more likely than white people to be killed by law enforcement (*page 94*). In September 2020 the editors of *Scientific American* called for sweeping reforms of U.S. law enforcement, from demilitarizing police forces to hiring more social workers and mental health professionals to respond to nonviolent incidents (*page 98*).

People of color are more likely to suffer the consequences of a degraded and plundered environment as well: Those with power benefit from exploiting the natural world, but it's the poorest among us who bear the impacts, including toxic pollution (*page 100*). Asian, Hispanic and Black people experience the highest rates of asthma in the nation, which are strongly linked to dirty inner-city air (*page 106*).

In her influential book *Why Are All the Black Kids Sitting Together in the Cafeteria?,* psychologist Beverly Daniel Tatum analogized racism this way: as a moving walkway at the airport that will carry you along unless you walk, vigorously, in the other direction. As Morris writes, lasting change will depend on how well each of us can disrupt the regimes of racial inequality. We must all turn around and conscientiously walk toward a more just world.

Andrea Gawrylewski,
Senior Editor, Collections, editors@sciam.com

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SPECIAL EDITION

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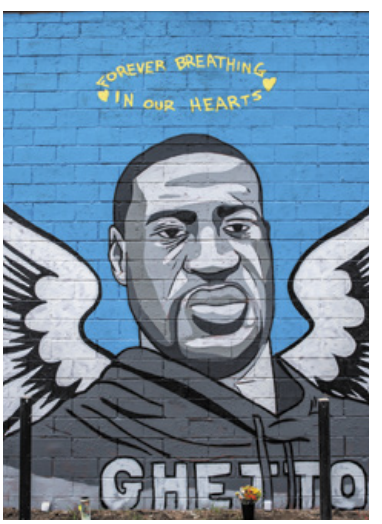

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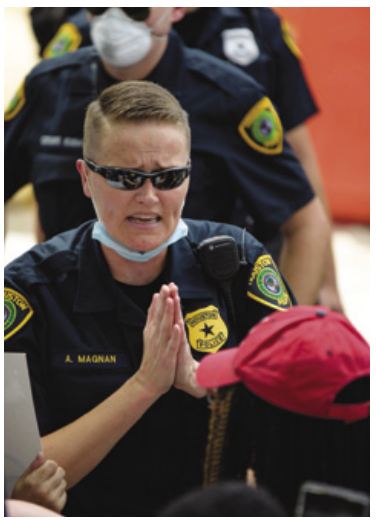

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Articles in this special issue are updated or adapted from previous issues of *Scientific American* and *Nature* and from ScientificAmerican.com.
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Scientific American Special (ISSN 1936-1513), Volume 30, Number 3, Summer 2021, published by Scientific American, a division of Springer Nature America, Inc., 1 New York Plaza, Suite 4600, New York, N.Y. 10004-1562. Canadian BN No. 127387652RT; TVQ1218059275 TQ0001. To purchase additional quantities: U.S., $13.95 each; elsewhere, $17.95 each. Send payment to Scientific American Back Issues, P.O. Box 3187, Harlan, Iowa 51537. **Inquiries: fax 212-355-0408 or telephone 212-451-8415. Printed in U.S.A.**

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THE POWER

CIVIL RIGHTS supporters march from Selma to Montgomery in Alabama on March 9, 1965, in a campaign to register Black voters. Days earlier a similar group of nonviolent protesters had been brutally beaten by state troopers at the Edmund Pettus Bridge. This time Martin Luther King, Jr., who led the march, avoided confrontation and asked the campaigners to kneel and pray at the site of the attack before walking back to Selma, in an effort to morally pressure President Lyndon B. Johnson to extend federal protection to the peaceful protest.

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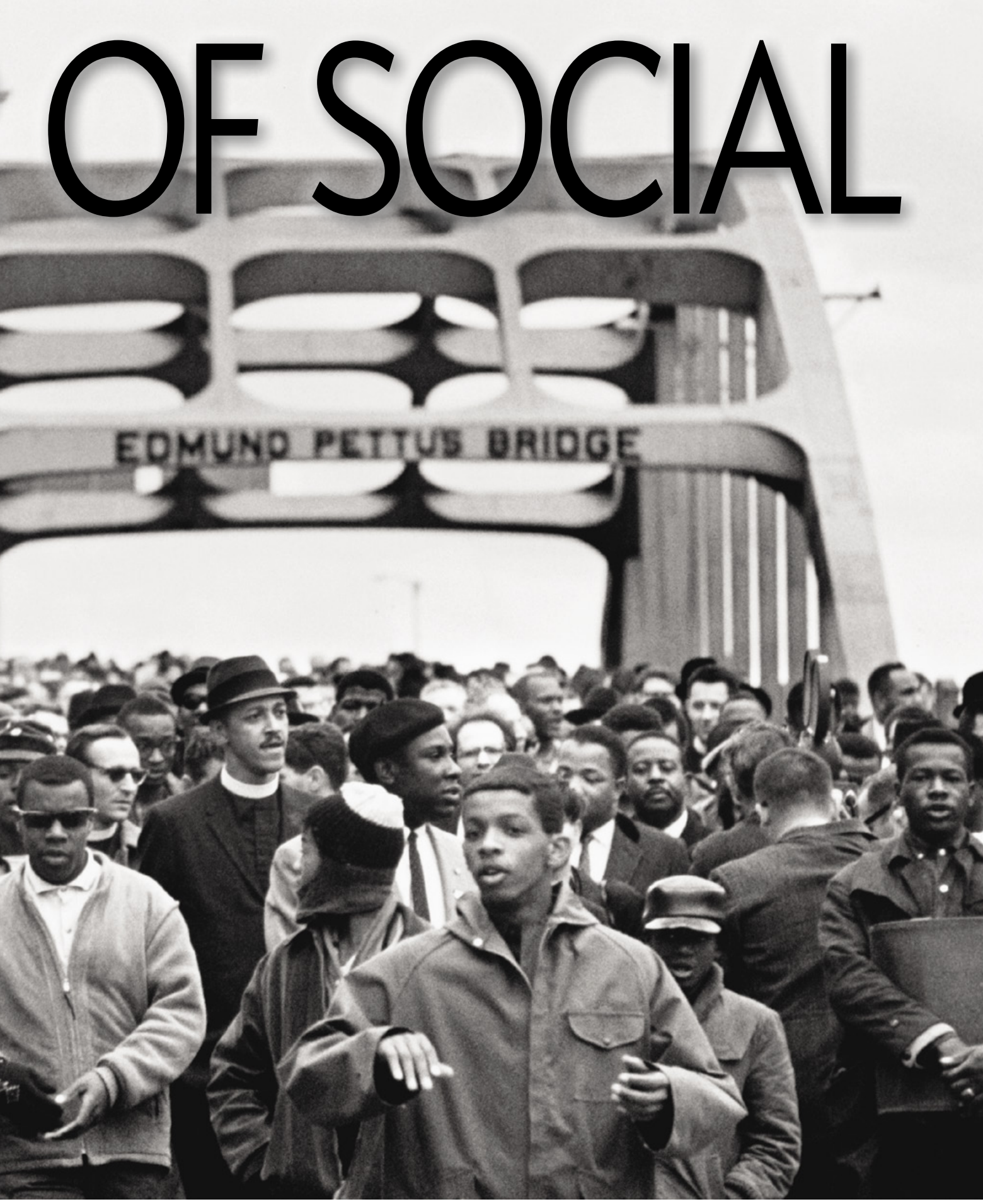
OF SOCIAL



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JUSTICE MO

BLACK LIVES MATTER activists march across the George Washington Bridge in New York City on September 12, 2020, to protest systemic injustices, including the killings of Black people by police.

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VEMENTS

Flip Schulke *Getty Images (preceding pages);* **Jason D. Little** *(this page)*

Black Lives Matter takes the baton from the Civil Rights Movement

By Aldon Morris

ONE EVENING NINE YEARS ago 17-year-old Trayvon Martin was walking through a Florida neighborhood with candy and iced tea when a vigilante pursued him and ultimately shot him dead. The killing shocked me back to the summer of 1955, when as a six-year-old boy I heard that a teenager named Emmett Till had been lynched at Money, Miss., less than 30 miles from where I lived with my grandparents. I remember the nightmares, the trying to imagine how it might feel to be battered beyond recognition and dropped into a river.

The similarities in the two assaults, almost six decades apart, were uncanny. Both youths were Black, both were visiting the communities where they were slain, and in both cases their killers were acquitted of murder. And in both cases, the anguish and outrage that Black people experienced on learning of the exonerations sparked immense and significant social movements. In December 1955, days after a meeting in her hometown of Montgomery, Ala., about the failed effort to get justice for Till, Rosa Parks refused to submit to racially segregated seating rules on a bus—igniting the Civil Rights Movement (CRM). And in July 2013, on learning about the acquittal of Martin's killer, Alicia Garza, Patrisse Cullors and Opal Tometi invented the hashtag #BlackLivesMatter, a rallying cry for numerous local struggles for racial justice that sprang up across the U.S.

The Black Lives Matter (BLM) movement is still unfolding, and it is not yet clear what social and political transformations it will engender. But within a decade after Till's murder, the social move-

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ment it detonated overthrew the brutal "Jim Crow" order in the Southern states of the U.S. Despite such spectacular achievements, contemporary scholars such as those of the Chicago School of Sociology continued to view social movements through the lens of "collective behavior theory." Originally formulated in the late 19th century by sociologist Gabriel Tarde and psychologist Gustave Le Bon, the theory disdained social movements as crowd phenomena: ominous entities featuring rudderless mobs driven hither and thither by primitive and irrational urges.

As a member of what sociologist and activist Joyce Ladner calls the Emmett Till generation, I identify viscerally with struggles for justice and have devoted my life to studying their origins, nature, patterns and outcomes. Around the world, such movements have played pivotal roles in overthrowing slavery, colonialism, and other forms of oppression and injustice. And although the core methods by which they overcome seemingly impossible odds are now more or less understood, these struggles necessarily (and excitingly) continue to evolve faster than social scientists can comprehend them. A post-CRM generation of scholars was nonetheless able to shift the study of movements from a psychosocial approach that asked "What is wrong with the participants? Why are they acting irrationally?" to a methodological one that sought answers to questions such as "How do you launch a movement? How do you sustain it despite repression? What strategies are most likely to succeed, and why?"

JIM CROW

SOCIAL MOVEMENTS have likely existed for as long as oppressive human societies have, but only in the past few centuries has their praxis—meaning, the melding of theory and practice that they involve—developed into a craft, to be learned and honed. The praxis has always been and is still being developed by the marginalized and has of necessity to be nimbler than the scholarship, which all too often serves the powerful. Key tactics have been applied, refined and shared across continents, including the boycott, which comes from the Irish struggle against British colonialism; the hunger strike, which has deep historical roots in India and Ireland and was widely used by women suffragettes in the U.K.; and nonviolent direct action, devised by Mahatma Gandhi in South Africa and India. They led to the overthrow of many unjust systems, including the global colonial order, even as collective behavior theorists continued to see social movements as irrational, spontaneous and undemocratic.

The CRM challenged these orthodoxies. To understand how extraordinary its achievements were, it is necessary to step into the past and understand how overwhelming the Jim Crow system of racial domination seemed even as late as the 1950s, when I was born. Encompassing the economic, political, legal and social spheres, it loomed over Black communities in the Southern U.S. as an unshakable edifice of white supremacy.

Jim Crow laws, named after an offensive minstrel caricature, were a collection of 19th-century state and local statutes that legalized racial segregation and relegated Black people to the bottom of the economic order. They had inherited almost nothing from the slavery era, and although they were now paid for their work, their job opportunities were largely confined to menial and manual labor. In consequence, nonwhite families earned 54 percent of the median income of white families in 1950. Black people had the formal right to vote, but the vast majority, especially in the South, were prevented from voting through various legal maneuvers and threats of violent retaliation. Blacks' lack of political power enabled their constitutional rights to be ignored—a violation codified in the 1857 "Dred Scott" decision of the Supreme Court asserting that Black people had "no rights which the white man was bound to respect."

Racial segregation, which set Black people apart from the rest of humanity and labeled them as inferiors, was the linchpin of this society. Humiliation was built into our daily lives. As a child, I drank from "colored" water fountains, went around to the back of the store to buy ice cream, attended schools segregated by skin color and was handed textbooks ragged from prior use by white students. A week after classes started in the fall, almost all my classmates would vanish to pick cotton in the fields so that their families could survive. My grandparents were relatively poor, too, but after a lifetime of sharecropping they purchased a plot of land that we farmed; as a proud, independent couple, they were determined that my siblings and I study. Even they could not protect us from the fear, however: I overheard whispered conversations about Black bodies hanging from trees. Between the early 1880s and 1968 more than 3,000 Black people were lynched—hung from branches of trees; tarred, feathered and beaten by mobs; or doused with gasoline before being set ablaze. This routine terror reinforced white domination.

But by 1962, when I moved to Chicago to live with my mother, protests against Jim Crow were raging on the streets, and they thrilled me. The drama being beamed into American living rooms—I remember being glued to the television when Martin Luther King, Jr., delivered his "I Have a Dream" speech in 1963—earned the movement tens of thousands of recruits, including me. And although my attending college was something of an accident, my choice of subject in graduate school, sociology, was not. Naively believing that there were fundamental laws of social movements, I intended to master them and apply them to Black liberation movements as a participant and, I fantasized, as a leader.

As I studied collective behavior theory, however, I became outraged by its denigration of participants in social movements as fickle and unstable, bereft of legitimate grievances and under the spell of agitators. Nor did the syllabus include the pioneering works of W.E.B. Du Bois, a brilliant scholar who introduced empirical methods into sociology, produced landmark studies of inequality and Black emancipation, and co-founded the National Association for the Advancement of Colored Peoples (NAACP) in 1909. I was not alone in my indignation; many other social science students of my generation, who had participated in the movements of the era, did not see their experiences reflected in the scholarship. Rejecting past orthodoxies, we began to formulate an understanding of social movements based on our lived experiences, as well as on immersive studies in the field.

BUS BOYCOTT

IN CONDUCTING my doctoral research, I followed Du Bois's lead in trying to understand the lived experiences of the oppressed. I interviewed more than 50 architects of the CRM, including many of my childhood heroes. I found that the movement arose organically from within the Black community, which also organized, designed, funded and implemented it. It continued a centuries-long tradition of resistance to oppression that had begun on slave ships and contributed to the abolition of slavery. And it worked

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VOTING RIGHTS activists march 54 miles from Selma to Montgomery in 1965. The third attempt to reach Montgomery succeeded on March 25 with the protection of the federal government. The heroism and discipline of the protesters, who endured violent attacks without retaliation or retreat, enabled the passage of the Voting Rights Act that August.

in tandem with more conventional approaches, such as appeals to the conscience of white elites or to the Constitution, which guaranteed equality under the law. The NAACP mounted persistent legal challenges to Jim Crow, resulting in the 1954 Supreme Court decision to desegregate schools. But little changed on the ground.

How could Black people, with their meager economic and material resources, hope to confront such an intransigent system? A long line of Black thinkers, including Frederick Douglass, Ida B. Wells and Du Bois, believed that the answer could be found in social protest. Boycotts, civil disobedience (refusal to obey unjust laws) and other direct actions, if conducted in a disciplined and nonviolent manner and on a massive scale, could effectively disrupt the society and economy, earning leverage that could be used to bargain for change. "Nonviolent direct action seeks to create such a crisis and foster such a tension that a community which has constantly refused to negotiate is forced to confront the issue. It seeks so to dramatize the issue that it can no longer be ignored," King would explain in an open letter from the Birmingham jail.

The reliance on nonviolence was both spiritual and strategic. It resonated with the traditions of Black churches, where the CRM was largely organized. And the spectacle of nonviolent suffering in a just cause had the potential to discomfit witnesses and render violent and intimidating reprisals less effective. In combination with disruptive protest, the sympathy and support of allies from outside the movement could cause the edifice of power to crumble.

The Montgomery bus boycott in 1955, which inaugurated the CRM, applied these tactics with flair and originality. It was far from spontaneous and unstructured. Parks and other Black commuters had been challenging bus segregation for years. After she was arrested for refusing to give up her seat, members of the Women's Political Council, including Jo Ann Robinson, worked all night to print thousands of leaflets explaining what had happened and calling for a mass boycott of buses. They distributed the leaflets door to door, and to further spread the word, they approached local Black churches. A young minister named King, new to Montgomery, had impressed the congregation with his eloquence; labor leader E. D. Nixon and others asked him to speak for the movement. The CRM, which had begun decades earlier, flared into a full-blown struggle.

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The Montgomery Improvement Association, formed by Ralph Abernathy, Nixon, Robinson, King and others, organized the movement through a multitude of churches and associations. Workshops trained volunteers to endure insults and assaults; strategy sessions planned future rallies and programs; community leaders organized car rides to make sure some 50,000 people could get to work; and the transportation committee raised money to repair cars and buy gas. The leaders of the movement also collected funds to post bail for those arrested and assist participants who were being fired from their jobs. Music, prayers and testimonies of the personal injustices that people had experienced provided moral support and engendered solidarity, enabling the movement to withstand repression and maintain discipline.

Despite reprisals such as the bombing of King's home, almost the entire Black community of Montgomery boycotted buses for more than a year, devastating the profits of the transport company. In 1956 the Supreme Court ruled that state bus segregation laws were unconstitutional. Although the conventional approach—a legal challenge by the NAACP—officially ended the boycott, the massive economic and social disruption it caused was decisive. Media coverage—in particular of the charismatic King—had revealed to the nation the cruelty of Jim Crow. The day after the ruling went into effect, large numbers of Black people boarded buses in Montgomery to enforce it.

This pioneering movement inspired many others across the South. In Little Rock, Ark., nine schoolchildren, acting with the support and guidance of journalist Daisy Bates, faced down threatening mobs to integrate a high school in 1957. A few years later Black college students, among them Diane Nash and John Lewis of Nashville, Tenn., began a series of sit-ins at "whites only" lunch counters. Recognizing the key role that students, with their idealism and their discretionary time, could play in the movement, visionary organizer Ella Baker encouraged them to form their own committee, the Student Nonviolent Coordinating Committee, which started to plan and execute actions independently. Escalating the challenge to Jim Crow, Black and white activists began boarding buses in the North, riding them to the South to defy bus segregation. When white mobs attacked the buses in Birmingham and the local CRM leadership, fearing casualties, sought to call off the "Freedom Rides," Nash ensured that they continued. "We cannot let violence overcome nonviolence," she declared.

The sophisticated new tactics had caught segregationists by surprise. For example, when the police jailed King in Albany, Ga., in 1961 in the hope of defeating the movement, it escalated instead: outraged by his arrest, more people joined in. To this day, no one knows who posted bail for King; many of us believe that the authorities let him go rather than deal with more protesters. The movement continually refined its tactics. In 1963 hundreds of people were being arrested in Birmingham, Ala., so CRM leaders decided to fill the jails, leaving the authorities with no means to arrest more people. In 1965 hundreds of volunteers, among them John Lewis, marched from Selma to Montgomery in Alabama to protest the suppression of Black voters and were brutally attacked by the police.

The turmoil in the U.S. was being broadcast around the world at the height of the cold war, making a mockery of the nation's claim to representing the pinnacle of democracy. When President Lyndon B. Johnson formally ended the Jim Crow era by signing the Civil Rights Act in 1964 and the Voting Rights Act in 1965, he did so because massive protests raging in the streets had forced it. The creation of crisis-packed disruption by means of deep organization, mass mobilization, a rich church culture, and thousands of rational and emotionally energized protesters delivered the death blow to one of the world's brutal regimes of oppression.

FRAMEWORKS

AS I CONDUCTED my doctoral research, the first theories specific to modern social movements were beginning to emerge. In 1977 John McCarthy and Mayer Zald developed the highly influential resource mobilization theory. It argued that the mobilization of money, organization and leadership were more important than the existence of grievances in launching and sustaining movements—and marginalized peoples depended on the largesse of more affluent groups to provide these resources. In this view, the CRM was led by movement "entrepreneurs" and funded by Northern white liberals and sympathizers.

At roughly the same time, William Gamson, Charles Tilly and my graduate school classmate Doug McAdam developed politi-

BLACK STUDENTS from Saint Augustine's College sit at a lunch counter reserved for white customers in Raleigh, N.C., to challenge racial segregation in February 1960. Many participants in these protests were assaulted or arrested.

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ROSA PARKS refused to relinquish her seat to a white man on a bus in Montgomery, Ala., in December 1955, triggering the Civil Rights Movement of the 1950s and 1960s.

Bettmann *Getty Images (opposite page)*; **Underwood Archives** *Getty Images (this page)*

cal process theory. It argues that social movements are struggles for power—the power to change oppressive social conditions. Because marginalized groups cannot effectively access normal political processes such as elections, lobbying or courts, they must employ "unruly" tactics to realize their interests. As such, movements are insurgencies that engage in conflict with the authorities to pursue social change; effective organization and innovative strategy to outmaneuver repression are key to success. The theory also argues that external windows of opportunity, such as the 1954 Supreme Court decision to desegregate schools, must open for movements to succeed because they are too weak on their own.

Thus, both theories see external factors, such as well-heeled sympathizers and political opportunities, as crucial to the success of movements. My immersive interviews with CRM leaders brought me to a different view, which I conceptualized as the indigenous perspective theory. It argues that the agency of movements emanates from within oppressed communities—from their institutions, culture and creativity. Outside factors such as court rulings are important, but they are usually set in motion and implemented by the community's actions. Movements are generated by grassroots organizers and leaders—the CRM had thousands of them in multiple centers dispersed across the South—and are products of meticulous planning and strategizing. Those who participate in them are not isolated individuals; they are embedded in social networks such as church, student or friendship circles.

Resources matter, but they come largely from within the community, at least in the early stages of a movement. Money sustains activities and protesters through prolonged repression. Secure spaces are needed where they can meet and strategize; also essential are cultural resources that can inspire heroic self-sacrifice. When facing police armed with batons and attack dogs, for example, the protesters would utter prayers or sing songs that had emerged from the struggle against slavery, bolstering courage and maintaining discipline.

The indigenous perspective theory also frames social movements as struggles for power, which movements gain by preventing power holders from conducting economic, political and social business as usual. Tactics of disruption may range from nonviolent measures such as strikes, boycotts, sit-ins, marches and courting mass arrest to more destructive ones, including looting, urban rebellions and violence. Whichever tactics are

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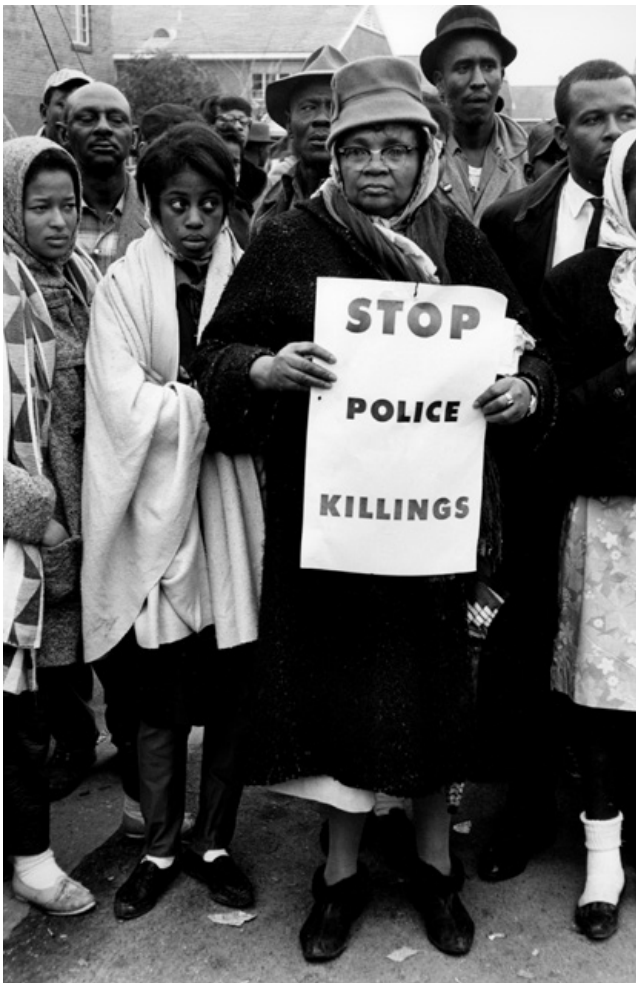
POSTER at a Selma-to-Montgomery march in 1965 protested the killings of Black people by police.



MORE THAN 200,000 people participated in the March on Washington on August 28, 1963, where King articulated the aspirations of millions with his famous "I Have a Dream" speech.

WE DEMAND DECENT HOUSING NOW!
WE DEMAND EQUAL RIGHTS NOW!
WE DEMAND DECENT HOUSING NOW!
WE DEMAND AN END TO BIAS NOW!
WE DEMAND DECENT HOUSING NOW!
THE BAPTIST MINISTERS CONFERANCE
I.U.E.
WE MARCH TOGE

Steve Schapiro *Getty Images (top)*; Hulton Archive *Getty Images (bottom)*

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BAYONETS wielded by police officers halt unarmed protesters seeking to reach city hall in Prichard, Ala., in June 1968, months after King's assassination in Memphis, Tenn., in April.

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GEORGE FLOYD'S murder by a police officer in Minneapolis, Minn., on May 25, 2020, triggered the largest protests in U.S. history, including this one in New York City the following June.

Justin Aharon

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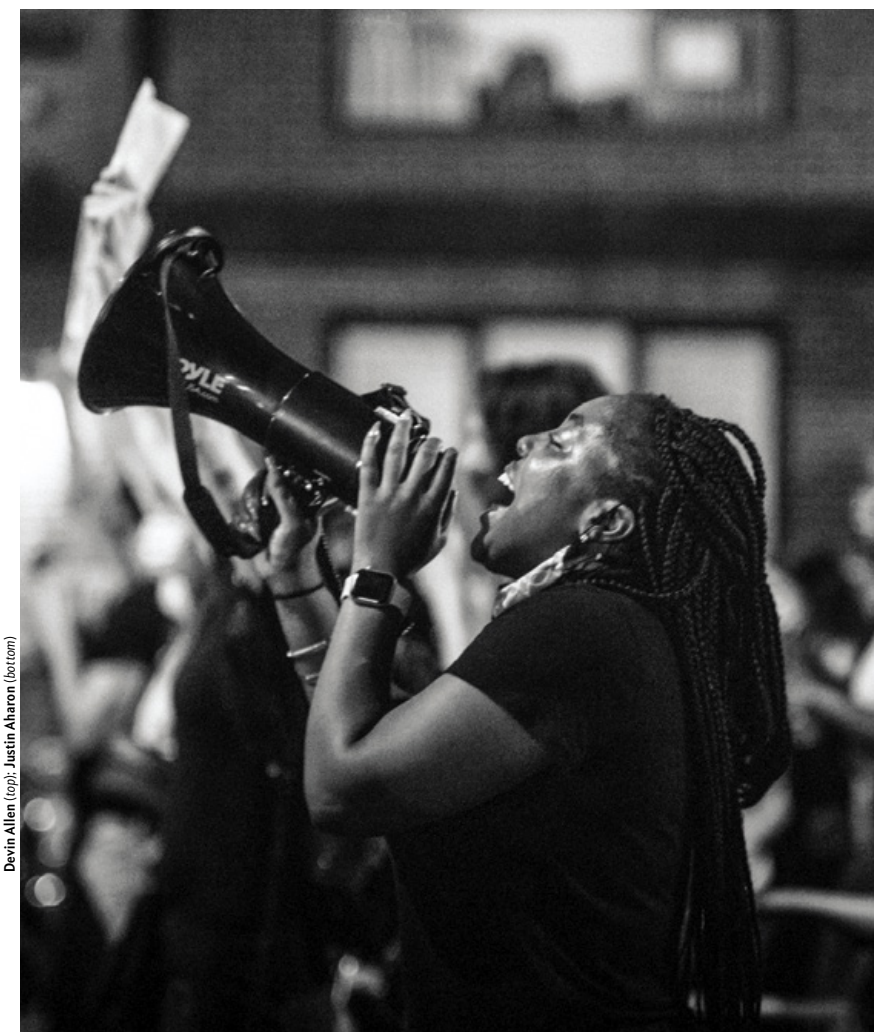
GRIEVOUS INJURIES sustained by 25-year-old Freddie Gray of Baltimore, Md., during his arrest on April 12, 2015, sparked this standoff in front of a police station. Gray died the day after the protest.



CHANTING "Wake up, wake up! This is your fight, too!" a demonstrator summons bystanders to a Black Lives Matter protest in Brooklyn, N.Y., on June 12, 2020.

Devin Allen (*top*); **Justin Aharon** (*bottom*)

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"GET YOUR KNEE OFF OUR NECKS" was the slogan for a protest at the National Mall on August 28, 2020, the 57th anniversary of the historic March on Washington led by King. The event honored the Civil Rights Movement while acknowledging the challenge of eradicating systemic racial and economic injustice in the U.S.

Joshua Rashaad McFadden

employed, the ultimate goal is to disrupt the society sufficiently that power holders capitulate to the movement's demands in exchange for restoration of social order.

Decades later cultural sociologists, including Jeff Goodwin, James Jasper and Francesca Polletta, challenged the earlier theories of resource mobilization and political process for ignoring culture and emotions. They pointed out that for movements to develop, a people must first see themselves as being oppressed. This awareness is far from automatic: many of those subjected to perpetual subordination come to believe their situation is natural and inevitable. This mindset precludes protest. "Too many people find themselves living amid a great period of social change, and yet they fail to develop the new attitudes, the new mental responses, that the new situation demands," King remarked. "They end up sleeping through a revolution." But such outlooks can be changed by organizers who make the people aware of their oppression (by informing them of their legal rights, for example, or reminding them of a time when their ancestors were free) and help them develop cultures of resistance.

Collective behavior theorists were right that emotions matter—but they had the wrong end of the stick. Injustice generates anger and righteous indignation, which organizers can summon in strategizing to address the pains of oppression. Love and empathy can be evoked to build solidarity and trust among protesters. Far from being irrational distractions, emotions, along with transformed mental attitudes, are critical to achieving social change.

BLACK LIVES

ON APRIL 4, 1968, I was having "lunch" at 7 P.M. at a Chicago tavern with my colleagues—we worked the night shift at a factory that manufactured farming equipment—when the coverage was interrupted to announce that King had been assassinated. At the time, I was attracted by the Black Panthers and often dis-

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cussed with friends about whether King's nonviolent methods were still relevant. But we revered him nonetheless, and the murder shocked us. When we returned to the factory, our white foremen sensed our anger and said we could go home. Riots and looting were already spreading across the U.S.

The assassination dealt a powerful blow to the CRM. It revived a long-standing debate within the Black community about the efficacy of nonviolence. If the apostle of peace could so easily be felled, how could nonviolence work? But it was just as easy to murder the advocates of self-defense and revolution. A year later the police entered a Chicago apartment at 4:30 A.M. and assassinated two leaders of the Black Panther party.

A more pertinent lesson was that overreliance on one or more charismatic leaders made a movement vulnerable to decapitation. Similar assaults on leaders of social movements and centralized command structures around the world have convinced the organizers of more recent movements, such as the Occupy movement against economic inequality and BLM, to eschew centralized governance structures for loose, decentralized ones.

The triggers for both the CRM and BLM were the murders of Black people, but the rage that burst forth in sustained protest stemmed from far deeper, systemic injuries. For the CRM, the wound was racial oppression based on Jim Crow; for BLM, it is the devaluation of Black lives in all domains of American life. As scholar Keeanga-Yamahtta Taylor and others point out, when BLM was emerging, over a million Black people were behind bars, being incarcerated at more than five times the rate of whites. Black people have died at nearly two times the rate of whites during the COVID-19 pandemic, laying bare glaring disparities in health and other circumstances. And decades of austerity politics have exacerbated the already enormous wealth gap: the current net worth of a typical white family is nearly 10 times that of a Black family. For such reasons, BLM demands go far beyond the proximate one that the murders stop.

The first uprisings to invoke the BLM slogan arose in the summer of 2014, following the suffocation death of Eric Garner in July—held in a police choke hold in New York City as he gasped, "I can't breathe"—and the shooting of Michael Brown in Ferguson, Mo., in August. Tens of thousands of people protested on the streets for weeks, meeting with a militarized response that included tanks, rubber bullets and tear gas. But the killings of Black adults and children continued unabated—and with each atrocity the movement swelled. The last straw was the murder of George Floyd in May 2020 in Minneapolis, Minn., which provoked mass demonstrations in every U.S. state and in scores of countries. Millions of Americans had lost their jobs during the pandemic; they had not only the rage but also the time to express it.

By fomenting disruptions across the globe, BLM has turned racial injustice into an issue that can no longer be ignored. Modern technology facilitated its reach and speed. Gone are the days of mimeographs, which Robinson and her colleagues used to spread news of Parks's arrest. Bystanders now document assaults on cell phones and share news and outrage worldwide almost instantaneously. Social media helps movements to mobilize people and produce international surges of protests at lighting speed.

The participants in BLM are also wonderfully diverse. Most of the local CRM centers were headed by Black men. But Bayard Rustin, the movement's most brilliant tactician, was kept in the background for fear that his homosexuality would be used to discredit its efforts. In contrast, Garza, Cullors and Tometi are all Black women, and two are queer. "Our network centers those who have been marginalized within Black liberation movements," the mission statement of their organization, the Black Lives Matter Global Network, announces. Many white people and members of other minority groups have joined the movement, augmenting its strength.

Another key difference is centralization. Whereas the CRM was deeply embedded in Black communities and equipped with strong leaders, BLM is a loose collection of far-flung organizations. The most influential of these is the BLM network itself, with dozens of chapters spread across the U.S., each of which organizes its own actions. The movement is thus decentralized, democratic and apparently leaderless. It is a virtual "collective of liberators" who build local movements while simultaneously being part of a worldwide force that seeks to overthrow race-based police brutality and hierarchies of racial inequality and to achieve the total liberation of Black people.

WHAT THE FUTURE HOLDS

BECAUSE SOCIETIES ARE DYNAMIC, no theory developed to explain a movement in a certain era can fully describe another one. The frameworks developed in the late 20th century remain relevant for the 21st, however. Modern movements are also struggles for power. They, too, must tackle the challenges of mobilizing resources, organizing mass participation, raising consciousness, dealing with repression and perfecting strategies of social disruption.

BLM faces many questions and obstacles. The CRM depended on tight-knit local communities with strong leaders, meeting in churches and other safe spaces to organize and strategize and to build solidarity and discipline. Can a decentralized movement produce the necessary solidarity as protesters face brutal repression? Will their porous Internet-based organizational structures provide secure spaces where tactics and strategies can be debated and selected? Can they maintain discipline? If protesters are not executing a planned tactic in a coordinated and disciplined manner, can they succeed? How can a movement correct a course of action that proves faulty?

Meanwhile the forces of repression are advancing. Technology benefits not only the campaigners but also their adversaries. Means of surveillance are now far more sophisticated than the wiretaps the FBI used to spy on King. Agents provocateur can turn peaceful protests into violent ones, providing the authorities with an excuse for even greater repression. How can a decentralized movement that welcomes strangers guard against such subversions?

Wherever injustice exists, struggles will arise to abolish it. Communities will continue to organize these weapons of the oppressed and will become more effective freedom fighters through trial and error. Scholars face the challenge of keeping pace with these movements as they develop. But they must do more: they need to run faster, to illuminate the paths that movements should traverse in their journeys to liberate humanity. SA

Aldon Morris is Leon Forrest Professor of Sociology and African American Studies at Northwestern University and president of the American Sociological Association. His landmark books include *The Origins of the Civil Rights Movement* (1986) and *The Scholar Denied: W.E.B. Du Bois and the Birth of Modern Sociology* (2015).

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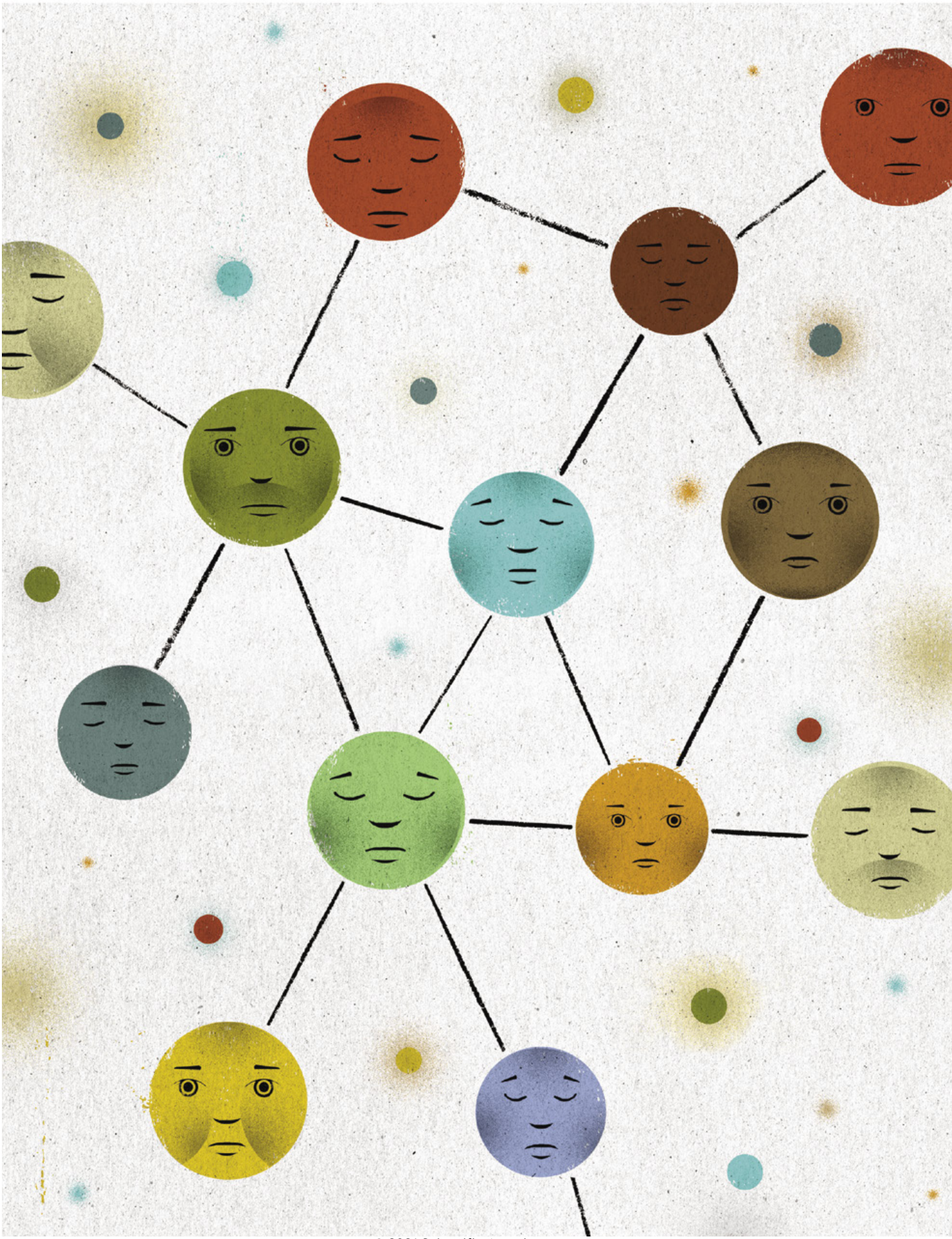

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HOW DIVERSITY WORKS

Being around people who are different from us makes us more creative, more diligent and harder-working

By Katherine W. Phillips

THE FIRST THING TO ACKNOWLEDGE about diversity is that it can be difficult. In the U.S., where the dialogue of inclusion is relatively advanced, even the mention of the word "diversity" can lead to anxiety and conflict. Supreme Court justices disagree on the virtues of diversity and the means for achieving it. Corporations spend billions of dollars to attract and manage diversity both internally and externally, yet they still face discrimination lawsuits, and the leadership ranks of the business world remain predominantly white and male.

It is reasonable to ask what good diversity does us. Diversity of *expertise* confers benefits that are obvious—you would not think of building a new car without engineers, designers and quality-control experts—but what about social diversity? What good comes from diversity of race, ethnicity, gender and sexual orientation? Research has shown that social diversity in a group can cause discomfort, rougher interactions, a lack of trust, greater perceived interpersonal conflict, lower communication, less cohesion, more concern about disrespect, and other problems. So what is the upside?

Illustrations by Edel Rodriguez

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The fact is that if you want to build teams or organizations capable of innovating, you need diversity. Diversity enhances creativity. It encourages the search for novel information and perspectives, leading to better decision-making and problem-solving. Diversity can improve the bottom line of companies and lead to unfettered discoveries and breakthrough innovations. Even simply being exposed to diversity can change the way you think. This is not just wishful thinking: it is the conclusion I draw from decades of research from organizational scientists, psychologists, sociologists, economists and demographers.

INFORMATION AND INNOVATION

THE KEY TO UNDERSTANDING the positive influence of diversity is the concept of informational diversity. When people are brought together to solve problems in groups, they bring different information, opinions and perspectives. This makes obvious sense when we talk about diversity of disciplinary backgrounds—think again of the interdisciplinary team building a car. The same logic applies to social diversity. People who are different from one another in race, gender and other dimensions bring unique information and experiences to bear on the task at hand. A male and a female engineer might have perspectives as different from each other as an engineer and a physicist—and that is a good thing.

WHEN PEOPLE ARE BROUGHT TOGETHER TO SOLVE PROBLEMS IN GROUPS, THEY BRING DIFFERENT INFORMATION, OPINIONS AND PERSPECTIVES.

Research on large, innovative organizations has shown repeatedly that this is the case. For example, business professors Cristian Deszö of the University of Maryland and David Gaddis Ross of the University of Florida studied the effect of gender diversity on the top firms in Standard & Poor's Composite 1500 list, a group designed to reflect the overall U.S. equity market. First, they examined the size and gender composition of firms' top management teams from 1992 through 2006. Then they looked at the financial performance of the firms. In their words, they found that, on average, "female representation in top management leads to an increase of $42 million in firm value." They also measured the firms' "innovation intensity" through the ratio of research and development expenses to assets. They found that companies that prioritized innovation saw greater financial gains when women were part of the top leadership ranks.

Racial diversity can deliver the same kinds of benefits. In a study conducted in 2003, Orlando Richard, now at the University of Massachusetts Amherst, and his colleagues surveyed executives at 177 national banks in the U.S., then put together a database comparing financial performance, racial diversity and the emphasis the bank presidents put on innovation. For innovation-focused banks, increases in racial diversity were clearly related to enhanced financial performance.

Evidence for the benefits of diversity can be found well beyond the U.S. In August 2012 a team of researchers at the Credit Suisse Research Institute issued a report in which they examined 2,360 companies globally from 2005 to 2011, looking for a relation between gender diversity on corporate management boards and financial performance. Sure enough, the researchers found that companies with one or more women on the board delivered higher average returns on equity, lower gearing (that is, net debt to equity) and better average growth.

HOW DIVERSITY PROVOKES THOUGHT

LARGE DATA-SET STUDIES have an obvious limitation: they only show that diversity is correlated with better performance, not that it causes better performance. Research on racial diversity in small groups, however, makes it possible to draw some causal conclusions. Again, the findings are clear: for groups that value innovation and new ideas, diversity helps.

In 2006 Margaret Neale of Stanford University, Gregory Northcraft of the University of Illinois at Urbana-Champaign and I set out to examine the impact of racial diversity on small decision-making groups in an experiment where sharing information was a requirement for success. Our subjects were undergraduate students taking business courses at the University of Illinois. We put together three-person groups—some consisting of all white members, others with two white members and one nonwhite member—and had them perform a murder mystery exercise. We made sure that all group members shared a common set of information, but we also gave each member important clues that only he or she knew. To find out who committed the murder, the group members would have to share all the information they collectively possessed during discussion. The groups with racial diversity significantly outperformed the groups with no racial diversity. Being with similar others leads us to think we all hold the same information and share the same perspective. This perspective, which stopped the all white groups from effectively processing the information, is what hinders creativity and innovation.

Other researchers have found similar results. In 2004 Anthony Lising Antonio, a professor at the Stanford Graduate School of Education, collaborated with five colleagues at the University of California, Los Angeles, and other institutions to examine the influence of racial and opinion composition in small group discussions. More than 350 students from three universities participated in the study. Group members were asked to discuss a prevailing social issue (either child labor practices or the death penalty) for 15 minutes. The researchers wrote dissenting opinions and had both Black and white members deliver them to their groups. When a Black person presented a dissenting perspective to a group of white people, the perspective was perceived as more novel and led to broader thinking and consideration of alternatives than when a white person introduced *that same dissenting perspective*. The lesson: when we hear dissent from someone who is different from us, it provokes more thought than when it comes from someone who looks like us.

This effect is not limited to race. For example, in 2013 professors of management Denise Lewin Loyd of the University of Illinois, Cynthia Wang of Northwestern University, Robert B. Lount, Jr., of the Ohio State University and I asked 186 people whether they identified as a Democrat or a Republican, then had them read a murder mystery and decide who they thought committed the crime. Next, we asked the subjects to prepare for

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a meeting with another group member by writing an essay communicating their perspective. More important, in all cases, we told the participants that their partner disagreed with their opinion but that they would need to come to an agreement with the other person. Everyone was told to prepare to convince their meeting partner to come around to their side; half of the subjects, however, were told to prepare to make their case to a member of the opposing political party, and half were told to make their case to a member of their own party.

The result: Democrats who were told that a fellow Democrat disagreed with them prepared less well for the discussion than Democrats who were told that a Republican disagreed with them. Republicans showed the same pattern. When disagreement comes from a socially different person, we are prompted to work harder. Diversity jolts us into cognitive action in ways that homogeneity simply does not.

For this reason, diversity appears to lead to higher-quality scientific research. In 2014 Richard Freeman, an economics professor at Harvard University and director of the Science and Engineering Workforce Project at the National Bureau of Economic Research, along with Wei Huang, a Harvard economics Ph.D. candidate, examined the ethnic identity of the authors of 1.5 million scientific papers written between 1985 and 2008 using Thomson Reuters's Web of Science, a comprehensive database of published research. They found that papers written by diverse groups receive more citations and have higher impact factors than papers written by people from the same ethnic group. Moreover, they found that stronger papers were associated with a greater number of author addresses; geographical diversity, and a larger number of references, is a reflection of more intellectual diversity.

THE POWER OF ANTICIPATION

DIVERSITY IS NOT ONLY about bringing different perspectives to the table. Simply adding social diversity to a group makes people *believe* that differences of perspective might exist among them and that belief makes people change their behavior.

Members of a homogeneous group rest somewhat assured that they will agree with one another; that they will understand one another's perspectives and beliefs; that they will be able to easily come to a consensus. But when members of a group notice that they are socially different from one another, they change their expectations. They anticipate differences of opinion and perspective. They assume they will need to work harder to come to a consensus. This logic helps to explain both the upside and the downside of social diversity: people work harder in diverse environments both cognitively and socially. They might not like it, but the hard work can lead to better outcomes.

In a 2006 study of jury decision-making, social psychologist Samuel Sommers of Tufts University found that racially diverse groups exchanged a wider range of information during deliberation about a sexual assault case than all-white groups did. In collaboration with judges and jury administrators in a Michigan courtroom, Sommers conducted mock jury trials with a group of real selected jurors. Although the participants knew the mock jury was a court-sponsored experiment, they did not know that the true purpose of the research was to study the impact of racial diversity on jury decision-making.

Sommers composed the six-person juries with either all white jurors or four white and two Black jurors. As you might expect, the diverse juries were better at considering case facts, made fewer errors recalling relevant information and displayed a greater openness to discussing the role of race in the case. These improvements did not necessarily happen because the Black jurors brought new information to the group—they happened because white jurors changed their behavior in the presence of the Black jurors. In the presence of diversity, they were more diligent and open-minded.

GROUP EXERCISE

CONSIDER THE FOLLOWING SCENARIO: You are writing up a section of a paper for presentation at an upcoming conference. You are anticipating some disagreement and potential difficulty communicating because your collaborator is American and you are Chinese. Because of one social distinction, you may focus on other differences between yourself and that person, such as her or his culture, upbringing and experiences—differences that you would not expect from another Chinese collaborator. How do you prepare for the meeting? In all likelihood, you will work harder on explaining your rationale and anticipating alternatives than you would have otherwise.

This is how diversity works: by promoting hard work and creativity; by encouraging the consideration of alternatives even before any interpersonal interaction takes place. The pain associated with diversity can be thought of as the pain of exercise. You have to push yourself to grow your muscles. The pain, as the old saw goes, produces the gain. In just the same way, we need diversity—in teams, organizations and society as a whole—if we are to change, grow and innovate. SA

Katherine W. Phillips headed the Sanford C. Bernstein & Co. Center for Leadership and Ethics at Columbia University and was senior vice dean at Columbia Business School. She passed away in 2020.

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OPINION

We'll Never Fix Systemic Racism by Being Polite

Contrary to the sanitized version we sometimes hear about the Civil Rights Movement, change was not achieved solely by protest marches and people singing "We Shall Overcome"

By Aldon Morris

VOLUNTEERS are trained to ignore provocation in preparation for a sit-in in May 1960 in Petersburg, Va.

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POLARIZED AMERICA AGREES ON ONE THING: THAT THE current round of protests against racist police violence may indeed force real reform. Former president Donald Trump said that protesters want to "overthrow the American Revolution" and that the National Guard and regular military must act decisively to "dominate the streets." Black Lives Matter activists worry that these protests, like so many over the past few decades, will eventually subside, leaving temporary concessions, symbolic victories and an unaltered regime of systemic racism, along with unabated police violence.

History shows us that Trump and others like him have some reason for fear—not of an actual rebellion but of a revolution that could overturn the racism that still pervades American society. Starting in the 1950s and continuing until the 1970s, civil rights protests overthrew the century-long and deeply embedded Jim Crow system in the South. How they accomplished this can offer important lessons for those intent on making Trump's fears come true.

In his 1963 "Letter from Birmingham Jail," Martin Luther King, Jr., succinctly summarized what he hoped the Birmingham campaign needed to accomplish to force durable structural change: "The purpose of our direct action program is to create a situation so crisis packed that it will inevitably open the door to negotiation."

These words were written in the midst of a comprehensive and sustained struggle to create chronic disruption in the city of Birmingham. Large contingents of protesters marched into—and refused to leave—the major downtown department stores; conducted sit-ins in virtually every inch of public space; and clogged all the major thoroughfares in the city. No customers could enter stores, no goods could be delivered, and no business was being conducted. The effort by public safety commissioner Bull Connor to "dominate the streets" using barbaric police violence against the demonstrators failed; instead it provoked even more disruption and larger protests. And further arrests were impossible because every jail in the city was filled far beyond capacity.

As King had predicted while incarcerated for his participation in these protests, a crisis-packed situation was achieved. And as soon as the business leaders and political elite realized that the demonstrations were indeed chronic, they negotiated with movement leaders, agreeing to dismantle racial segregation in commerce and public services.

These crisis-packed protests led to the eradication of Jim Crow laws and "Whites Only" signs and ultimately gave way to a regime change across the South. The creation of crisis-packed situations across the South resulted in the enactment of the 1964 Civil Rights Act and the 1965 Voting Rights Act. As I write in my book *The Origins of the Civil*

Howard Sochurek *Getty Images (preceding pages)*

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Rights Movement, contrary to the sanitized, rose-colored-glasses version of history, change was not generated through nondisruptive marches of people singing "We Shall Overcome." Whether the Black Lives Matter movement creates meaningful and lasting change depends on the degree to which it disrupts regimes of racial inequalities and can sustain that disruption until the captains of white supremacy are ready to negotiate.

The movement has made a good start toward creating and sustaining crisis-packed situations across the U.S. Triggered by the killing of George Floyd in Minnesota, mass demonstrations in every state and scores of other countries have been disrupting "business as usual" in virtually every realm of life. On the ground in countless cities, the movement has been replicating King's Birmingham strategy, filling streets and shopping areas with protests that prevent access to stores, interfere with deliveries and drive away customers, creating—in the midst of the massive disruption caused by the COVID-19 pandemic—a chronic crisis in business districts.

The protests are disrupting police routines—including their routine use of excessive violence against communities of color—and forcing them to restrain their wrongdoing in confronting legitimate protest. The confrontations between police and protesters have produced high-profile police misconduct that has led, as it did in Birmingham, to larger and more disruptive protests, promising to create the chronic crisis that King prescribed as the necessary prerequisite for meaningful negotiation.

The protests have dominated television, print and radio news cycles and have riveted attention on systemic racism. New voices and ideas are penetrating the media and disrupting the ingrained loyalty to many of the cultural practices and symbols endorsing and enforcing racism. Protesters have toppled and removed Confederate monuments from public places, gaining, for the first time in decades, the attention of major media and forcing government and private institutions to remove symbols of white supremacy from public display.

The protests have disrupted America's claim to moral leadership in global affairs, especially when Trump advocated and acted—as he did in Lafayette Park in Washington, D.C.—to "dominate the streets" with military attacks on those protesting violent police assaults. And like Connor's efforts in Alabama nearly 60 years ago, these attacks have failed, producing larger and more disruptive protests.

So far the disruptions have yielded symbolic changes, including changing flags, replacing monuments, renaming buildings and streets, amending music lyrics and altering our vocabulary of discourse. These changes are hard-won and important, but the eradication of these symbols of white supremacy does not ameliorate the material hardship of systemic racism. They are the first concessions granted because they are not expensive. The toppling of Confederate statues can produce hurt feelings, humiliation and even homicidal rage among those who cherish the symbols of white supremacy, but they do not cost billions of dollars.

The structural changes that can reduce or eradicate systemic racism are altogether different from cultural changes. They require the reallocation of basic resources to equalize income and wealth, employment and underemployment, educational opportunities, incarceration rates and access to quality health care.

> "THE PURPOSE OF OUR DIRECT ACTION PROGRAM IS TO CREATE A SITUATION SO CRISIS PACKED THAT IT WILL INEVITABLY OPEN THE DOOR TO NEGOTIATION."
>
> —*MARTIN LUTHER KING, JR.*

Structural changes are very expensive to implement, and they involve a zero-sum logic that places powerful institutions on the wrong side of history. They involve transferring money currently earmarked for police weaponry to underfunded schools in Black communities; slashing the military budget to finance low-income housing; and taxing obscene levels of executive pay and bloated corporate profits to make the minimum wage a living wage. To achieve structural changes, widespread and sustained social disruptions must continue until the powerful people and institutions whose funds are needed for equalization are ready to negotiate.

This is a unique moment in American history. The crucial question is whether current or future white and Black leaders of these powerful institutions appreciate that chronic crisis can only be ended if they negotiate the changes needed to move the country toward the democratic ideals it put on paper centuries ago. There are glimmers of hope that the current protests have been sufficient to compel negotiations that have already led to some reforms (outlawing choke holds, for example) and put more on the table for the first time, such as defunding the police. If these initial signs do not mature into systemic reform, then national crisis-packed disruption will be needed to move the U.S. toward a more perfect union. SA

Aldon Morris is Leon Forrest Professor of Sociology and African American Studies at Northwestern University and president of the American Sociological Association. His landmark books include *The Origins of the Civil Rights Movement* (1986) and *The Scholar Denied: W.E.B. Du Bois and the Birth of Modern Sociology* (2015).

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HOW TO UNLEARN RACISM

Implicit bias training isn't enough. What actually works?

By Abigail Libers

Illustration by Benjamin Currie

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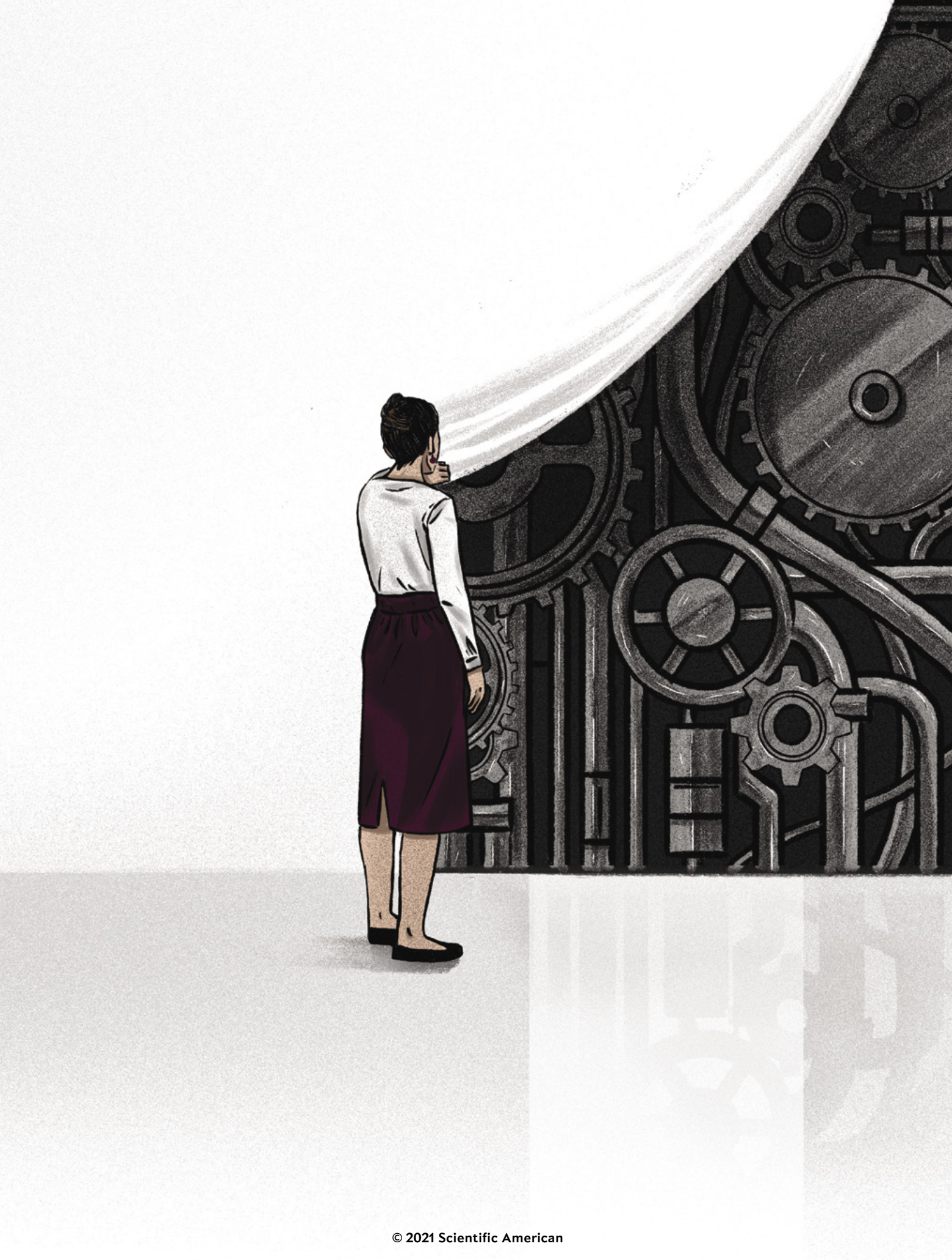

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IN FEBRUARY 2016 I SAT IN A CONFERENCE ROOM ON THE UPPER EAST SIDE OF MANHATTAN with about 35 other people attempting to answer what seemed like a straightforward question: *What is racism?*

I—a white, able-bodied, cis-gendered woman in my 30s—thought that racism was prejudice against an individual because of race or ethnicity. That's why I had signed up for the Undoing Racism Workshop, a two-and-a-half-day antiracist training that analyzes race and power structures in the U.S.: I wanted to gain a better understanding of why some people have so much contempt toward those who are different from them. My yearning for answers came from personal experience with discrimination as a Jewish woman and the daughter of immigrants; my parents fled to the U.S. from the former Soviet Union in 1979. Growing up in a small town in upstate New York followed by an even smaller, more rural town in Georgia, I was picked on and often felt "othered."

The workshop was hosted by the People's Institute for Survival and Beyond (PISAB), an organization that was founded more than 40 years ago by community organizers who wanted to create a more equitable society by addressing the root causes of racism. Our leaders—a Black man, a white woman and a Latina woman—called on each of us to share our definitions of racism. People's responses were all over the map, from "a mean-spirited, close-minded way of thinking" to "discrimination based on someone's skin color or ethnic background." The trainers validated each of our responses before pointing out how varied they were and explaining that few of us had identified racism as a web of institutional power and oppression based on skin color. Not having a simple or agreed-on definition of racism makes it easier to keep racism in place. To undo racism, they said, we need a common language that ties together individual and systemic factors. Hearing racism described as a power hierarchy was eye-opening for me. Having been marginalized myself, I thought I was sensitive toward other groups who faced discrimination. I thought I got it.

Over the past year America has been reckoning with racism on a scale that has not been seen since the Civil Rights Movement. The killings of George Floyd, Ahmaud Arbery, Breonna Taylor and others sparked protests against systemic racism and police violence that have drawn multiracial participation. Some white Americans attended Black Lives Matter protests for the first time—the movement has been active since 2013—and saw up close the police brutality they previously only read about or witnessed through short video clips on phone screens. These experiences were a tiny window into the reality of violence and oppression that Black people endure. The pandemic further emphasizes the racial disparities that people are protesting, with Black, Latinx and Indigenous communities disproportionately affected by COVID-19. It has become widely discussed that police violence and virus deaths are not disparate issues—they are both embedded in a pervasive system of racism.

PISAB's definition of racism (which is similar to that of other antiracism organizations such as the Racial Equity Institute) is race prejudice plus power. It describes how individual and systemic racism are tied together. All of us have individual race prejudice: anyone can prejudge a person based on race alone. But what makes racism different from individual prejudice is who has institutional power. White people control our government systems and institutions in every sector, from law enforcement and education to health care and the media, leading to laws and policies that can advantage white people while disadvantaging everyone else.

White people's dominance in our systems is why you may have heard people refer to the U.S. as a white supremacist soci-

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ety. In this context, white supremacy does not refer to hate groups such as neo-Nazis and the Ku Klux Klan but rather to an entire *system* where one group has all the advantages. "Racism *is* white supremacy," says Joseph Barndt, an organizer and core trainer with PISAB and author of *Understanding and Dismantling Racism: The Twenty-First Century Challenge to White America*. "It's empowering one alleged racial group over another and creating systems to reinforce that."

As more white people seek to confront and undo racism in their own lives, they are figuring out how to "do the work." In recent years implicit bias trainings, which aim to expose people to the negative associations and stereotypes they hold and express unconsciously, have been widely used to raise people's awareness of racism in workplaces. But addressing bias is not sufficient for confronting the racist systems, ideas and legacies that are present in our day-to-day lives. There is no one-size-fits-all solution, but research shows that undoing racism often starts with understanding what race and racism actually are. It is also crucial to develop a positive racial identity; to feel—not just intellectualize—how racism harms *all* of us; and, finally, to learn how to break prejudice habits and become an active antiracist. Doing so, however, is not accomplished in a weekend. For me, one of the first steps was unlearning false ideas about the basis of racial categories.

ALTHOUGH BIOLOGY HAS SHOWN THAT THERE ARE NO GENETICALLY DISTINCT RACES, RACIAL *IDENTITY* IS VERY REAL. IN A WHITE-DOMINANT SOCIETY, WHITE PEOPLE TEND TO BE UNAWARE OF THEIR IDENTITY AND MAY THINK OF THEMSELVES AS NEUTRAL, AS NONRACIAL.

SEEING WHITENESS IN THE ORIGINS OF RACE

RACE IS DEEPLY EMBEDDED in our society, yet it is persistently misunderstood to be a biological construct rather than a cultural one. The concept of racial categories is actually quite modern, explains Crystal Fleming, a professor of sociology at Stony Brook University and author of *How to Be Less Stupid about Race:* "If we think about our species existing for at least a few hundred thousand years, it's only in the last several centuries that we see the historical emergence of the idea of race." This is a history that most Americans are not taught in school.

False classifications of humans that would later be called "races" began in the 16th and 17th centuries with Christian clergy questioning whether "Blacks" and "Indians" were human. As colonial expansion and slavery increased, religion was used to justify classifying Black people and other people of color as "pagan and soulless." But as many of them were converted to Christianity and the Age of Enlightenment took off in the 1700s, religion lost its legitimizing power.

Instead "science" was used to justify the enslavement of Africans and the genocide of Indigenous peoples, which had already been occurring in British colonies for more than a century. Johann Friedrich Blumenbach, a German anthropologist and comparative anatomist, is known for proposing one of the earliest classifications of the human race, which he wrote about in the late 1700s.

His measurement of skulls from around the world led him to divide humans into five groups, which were later simplified by anthropologists into three categories: Caucasoids, Mongoloids and Negroids. It did not seem to matter that some prominent scientists, including Charles Darwin, dismissed a biological basis for race over the next century. Many scientists dedicated themselves to proving a false racial hierarchy in which "Caucasians" were superior to other races.

In the U.S., political and intellectual leaders reinforced the false ideology that Africans were biologically inferior to other races and therefore best suited for slavery. After Bacon's Rebellion in 1676, which had united white and Black indentured servants, Virginia lawmakers began to make legal distinctions between "white" and "Black" people. Poor white indentured servants who served their term could go free and own land; Black servants were committed to lifelong servitude. With the Naturalization Act of 1790, Congress codified white racial advantage into law by limiting citizenship by naturalization to "free white persons," namely, white men. Women, people of color and indentured servants were excluded.

With white superiority cemented firmly into law, the social and political power of *whiteness* was born. As a category, it was increasingly associated with resources and power: explicit laws and practices that created whiteness as a requirement for being able to live in certain neighborhoods, to be able to vote, to own land, to testify in court before a jury. The legacy of "scientific" racism persists to this day.

Although biology has shown that there are no genetically distinct races, racial *identity*—how you and others perceive your race—is very real, as are its ramifications. In a white-dominant society like America, white people tend to be unaware of their identity and may think of themselves as neutral, as nonracial. According to the work of psychologist Janet Helms, who published six stages of white racial identity development in 1999, the first stage is defined by a lack of awareness of cultural and institutional racism. This stage is also characterized by being "color-blind"—imagining one does not see people's differences and viewing that as a positive trait others should aspire to.

As scholar and activist Peggy McIntosh notes in a 1989 article, this lack of awareness is common. She describes white privilege as an "invisible package of unearned assets that I can count on cashing in each day, but about which I was 'meant' to remain oblivious. White privilege is like an invisible weightless knapsack of special provisions, maps, passports, codebooks, visas, clothes, tools, and blank checks."

To unlearn racism then, white people must first examine their racial identity. Black scholars and writers of color have known this for more than a century; their survival depended on

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it. Frederick Douglass, W.E.B. Du Bois, James Baldwin, Audre Lorde, Angela Davis, Ta-Nehisi Coates and many others have observed, analyzed and written about whiteness for generations. Du Bois made observations about whiteness in 1899 with his sociological study *The Philadelphia Negro* and in 1935 with his book *Black Reconstruction in America*. Recently Ijeoma Oluo, author of *So You Want to Talk about Race,* wrote in a popular Medium article: "I know white culture better than most white people know white culture."

It has only been in the past few decades that white scholars have turned the lens on themselves with the emergence of Critical Whiteness Studies (CWS), a growing academic field that aims to examine the structures of white supremacy and privilege and to investigate the meaning of white privilege and how it is connected to complicity in racism. According to Barbara Applebaum, a professor of philosophy and education at Syracuse University, CWS shifts the focus, and thus the blame, from the victims of racism to the perpetrators. As she explains, "it names the elephant in the room—the construction and maintenance of whiteness."

THIS AWAKENING MAY LEAD PEOPLE TO WORK ON CREATING A POSITIVE RACIAL IDENTITY AWAY FROM WHITE SUPREMACISM. SHAME ISN'T AN EFFECTIVE MOTIVATOR AND CAN INHIBIT THE STAMINA NEEDED TO PUSH FOR SYSTEMIC CHANGE.

WORKSHOPS AREN'T ENOUGH

OVER THE PAST 20 YEARS or so initiatives to address racism have focused heavily on implicit bias trainings. A growing body of cognitive research demonstrates how these hidden biases impact our attitudes and actions, which result in real-world consequences such as racial profiling.

The trainings, which are often sponsored by human resources departments but delivered to employees by outside consulting firms, may consist of modules that walk people through what implicit bias is and where it comes from, how it shows up in the workplace, how it is measured (typically through the Implicit Association Test) and how to reduce it. Over the past decade these trainings have been widely used in the law-enforcement industry as well as in the tech industry, with companies such as Facebook and Google putting thousands of employees through trainings. More recently, antibias trainings have been implemented in schools for teachers.

While these sessions may be useful in exposing people's hidden biases, those revelations have not been shown to result in long-term behavioral change on an individual or systemic level. In a 2018 paper published in *Anthropology Now,* Harvard University sociologist Frank Dobbin writes: "Hundreds of studies dating back to the 1930s suggest that antibias training does not reduce bias, alter behavior or change the workplace."

A recent meta-analysis of 492 studies (with a total of 87,418 participants) on the effectiveness of implicit bias training found weak effects on unconscious bias. The authors note that "most studies focused on producing short-term changes with brief, single-session manipulations" and that most trainings "produced trivial changes in behavior." The authors conclude that changes in implicit bias are possible, but they do not necessarily translate into changes in explicit bias or behavior, and there is a significant lack of research on the long-term effects.

"Implicit bias trainings raise awareness, but they also tell people, 'This is just how the brain works,'" says Rachel Godsil, co-founder and co-director of the Perception Institute, an organization that works with social scientists to identify the efficacy of interventions to address implicit bias, racial anxiety and the effects of stereotypes. "It kind of leaves people feeling like they are let off the hook." It's not that your brain is hard-wired to be racist, but it *is* programmed to put people into categories. And the categories that have been constructed in the U.S., Godsil explains, have meanings that tend to be negative for people from marginalized groups. She emphasizes that part of what it means to unlearn racism is to delink stereotypes from identities and absolute truths: "You're not trying to be color-blind or pretend that these categories don't exist, but you don't presume you know anything about a person based on their identity."

Antiracism trainings, such as the Undoing Racism Workshop, differ significantly from implicit bias trainings in that they are more intense on both an intellectual and emotional level. Because they are not done in a corporate setting, the discussions tend to be more honest and raw. In the PISAB training I attended, we took a hard look at white supremacy and our role in upholding it. After reviewing a history of racism in the U.S., the trainers discussed individual and institutional racial attitudes, oppression and privilege, and how institutions implicitly or explicitly perpetuate racism. We were empowered to be "gatekeepers"—leaders who can affect change in our workplaces and communities.

PISAB's methodology is rooted in community organizing principles that the group's founders honed for decades. Their approach is based on philosopher Paulo Freire's pedagogy, which focuses on linking knowledge to action so people can make real change in their communities. Other antiracist trainings, such as the one offered by Crossroads Antiracism Organizing & Training, provide a similar approach. In contrast, Robin DiAngelo, author of *White Fragility: Why It's So Hard for White People to Talk about Racism,* who received much attention in 2020, gives "keynote presentations" that are more focused on individual prejudice and white privilege.

Whereas these trainings can be powerful in many ways, it is unclear to what degree they are effective—and if they are, how and why they work. A 2015 study published in *Race and Social Problems* aimed to measure the impact of PISAB's training and found that approximately 60 percent of participants engaged in racial equity work after completing the Undoing Racism Workshop. "These trainings are well intentioned, but we don't know if they work, because there aren't randomized controlled experiments to prove that they do," says Patricia Devine, a pro-

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fessor of psychology who studies prejudice at the University of Wisconsin–Madison.

Trainings on implicit bias, diversity and antiracism may be limited in their efficacy in part because they tend to be brief one-off events. Promising research by Devine in 2013 showed that prejudices and biases can be more successfully unlearned through longer-term intervention. The 12-week longitudinal study was based on the premise that implicit bias is like a habit that can be broken through the following steps: becoming aware of implicit bias, developing concern about the effects of that bias and using strategies to reduce bias—specifically, ones that replace biased reactions with responses that reflect one's nonprejudiced goals.

The researchers argue that the motivation to "break the prejudice habit" comes from two sources: First, you have to be aware of your biases, and second, you have to be *concerned* about the consequences of your biases to be motivated to make the effort needed to eliminate them. Recent research has shown that interacting with a wide variety of racial groups can help people care more about racial justice. For instance, a 2018 review suggested that increased contact among racial groups deepens psychological investment in equality by making people more empathetic.

For Fleming, who has educated thousands of university students, teaching implicit bias within the context of a comprehensive, three-month course "is far more effective than being dragged into a diversity training for an afternoon," she says. "People have to feel inspired. They have to feel a desire to critically reflect on not just their biases but on their socialization and conditioning and to be part of a positive social transformation. You can't force that on anyone."

FEELING THE HARMS OF RACISM

THE INSPIRATION that Fleming speaks to is what motivates me to unlearn racism, to reeducate myself on swaths of American history, and to open my eyes to whiteness and white supremacy. But the process of unlearning is only the first step, and it needs to translate into a commitment to practices such as breaking white silence and bringing an antiracist lens to my work. That is only possible, and sustainable, by building empathy and *feeling* the ways in which racism is not just harmful for people of color—it hurts white people, too.

This realization didn't hit me until I took PISAB's workshop for a second time in 2019. I had signed up at the urging of Stoop Nilsson, a social worker and racial reeducation coach who shows white people how to become antiracist leaders in their communities. During the workshop, Barndt, one of the trainers, pointed out how easy it can be for white people to think racism does not harm them. But "the truth is, with racism we lose, too," he said. "All of humanity loses. With the end of racism, we get our lives back."

H. Shellae Versey, a critical health researcher and professor of psychology at Fordham University, studies how white supremacy culture impacts the mental health of both white and nonwhite populations. In a 2019 paper, she and her co-authors explain how white people are harmed by the myth of meritocracy—the idea that working hard and pulling yourself up by your bootstraps leads to success. When this does not happen (for example, if you do not land a promotion you worked hard for), it threatens your worldview and leads to significant stress, research shows.

Versey notes that many white people oppose social health programs such as the Affordable Care Act that would actually benefit them, in part because they believe these programs are designed to benefit people of color. In his recent book *Dying of Whiteness,* physician Jonathan Metzl writes about how some white Americans support politicians who promote policies that increase their risk of sickness and death.

Another way we are all harmed on a day-to-day basis is through white supremacy culture. As Tema Okun and the late Kenneth Jones wrote in the book *Dismantling Racism: A Workbook for Social Change Groups,* the characteristics of white supremacy culture include perfectionism, a sense of urgency, defensiveness, quantity over quality, paternalism, either/or thinking, power hoarding, individualism, and more.

Understanding and *feeling* how racism hurts me—even though it is a mere fraction of the pain people of color experience—is part of what helps me internalize the motivation I need to consistently work to undo it. I wonder if white supremacy culture contributes to my elevated anxiety levels, which manifest as migraine headaches and torn-up cuticles. I am more clearly connecting white supremacy culture with climate change denial as well as the paternalism and overly rigid thinking I have experienced in various jobs.

Working with Nilsson is helping me create a positive racial identity of my own—as both a white person and a Russian Jew. Our country prides itself on being a melting pot, but much gets lost in the assimilation to whiteness and white supremacy culture. Markers of ethnic identity such as language, food, culture and music are discouraged; those from a non–Western European heritage are often vilified. In my family, my parents were so committed to learning English that they hardly ever spoke Russian around the house. I never learned it. It saddens me that I can't speak to my own parents in their native language and that I still know so little about our heritage. Recently my mom became frustrated trying to remember a word in English to describe how she was feeling; I worry that her last words will be in Russian, and I'll have no idea what they mean.

In the midst of COVID-19, a high-stakes election season and racial protest movements that illuminated issues affecting everyone, many Americans began reevaluating what matters most. White people may be waking up to areas of their lives that were previously inaccessible to them and to histories, literature and legacies that have long been excluded from school curriculums. This awakening may lead people to work on creating a positive racial identity away from white supremacism, one based on fully acknowledging the power of whiteness in our society and using that knowledge to pursue equality and justice for everyone. Skipping that step risks giving up or doing even more harm; shame and self-loathing are not effective motivators and can inhibit the strength and stamina needed to push for systemic change.

Having been in this process myself for several years, I am certain of only one thing: that antiracism is a lifelong practice. In her book *Why Are All the Black Kids Sitting Together in the Cafeteria?,* psychologist Beverly Daniel Tatum compares racism to smog, writing that it is something we all breathe in; no one is immune to it. Attempting to unlearn racism has meant becoming aware of each inhalation—and doing my best to exhale less of it. SA

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How to Think about "Implicit Bias"

Amid a controversy, it's important to remember that implicit bias is real—and it matters

By Keith Payne, Laura Niemi and John M. Doris

WHEN'S THE LAST TIME A STEREOTYPE popped into your mind? If you are like most people, the authors included, it happens all the time. That doesn't make you a racist, sexist or whatever-ist. It just means your brain is working properly, noticing patterns and making generalizations. But the same thought processes that make people smart can also make them biased. This tendency for stereotype-confirming thoughts to pass spontaneously through our minds is what psychologists call implicit bias. It sets people up to overgeneralize, sometimes leading to discrimination even when people feel they are being fair.

Studies of implicit bias have recently drawn ire from both the right and the left. For the right, talk of implicit bias is just another instance of progressives seeing injustice under every bush. For the left, implicit bias diverts attention from more damaging instances of explicit bigotry. Debates have become heated and have leaped from scientific journals to the popular press. Along the way, some important points have been lost. We highlight two misunderstandings that anyone who wants to understand implicit bias should know about.

First, much of the controversy centers on the most famous implicit bias test, the Implicit Association Test (IAT). A majority of people taking this test show evidence of implicit bias, suggesting that most individuals are implicitly biased even if they do not think of themselves as prejudiced. As with any measure, the test does have limitations. The stability of the test is low, meaning that if you take the same test a few weeks apart, you might score very differently. And the correlation between a person's IAT scores and discriminatory behavior is often small.

The IAT is a measure, and it doesn't follow from a particular *measure* being flawed that the *phenomenon* we are attempting to measure is not real. Drawing that conclusion is to commit the *Divining Rod Fallacy:* just because a rod doesn't find water doesn't mean there's no such thing as water. A smarter move is to ask, "What does the other evidence show?"

In fact, there is lots of other evidence. There are perceptual illusions, for example, in which white subjects perceive Black faces as angrier than white faces with the same expression. Race can bias people to see harmless objects as weapons when they are in the hands of Black men and to dislike abstract images that are paired with Black faces. And there are dozens of variants of laboratory tasks finding that most participants are faster to identify bad words paired with Black faces than white faces. None of these measures is without limitations, but they show the same pattern of reliable bias as the IAT. There is a mountain of evidence—independent of any single test—that implicit bias is real.

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The second misunderstanding is about what scientists mean when they say a measure predicts behavior. One frequent complaint is that an individual's IAT score doesn't tell you whether the person will discriminate on a particular occasion. This is to commit the *Palm Reading Fallacy:* unlike palm readers, research psychologists aren't usually in the business of telling you, as an individual, what your life holds in store. Most measures in psychology, from aptitude tests to personality scales, are useful for predicting how *groups* will respond *on average,* not forecasting how particular *individuals* will behave.

The difference is crucial. Knowing that an employee scored high on conscientiousness won't tell you much about whether her work will be careful or sloppy if you inspect it right now. But if a large company hires hundreds of employees who are all conscientious, this will likely pay off with a small but consistent increase in careful work on average.

Implicit bias researchers have always warned against using the tests for predicting individual outcomes, such as how a particular manager will behave in job interviews—they've never been in the palm-reading business. What the IAT does, and does well, is predict average outcomes across larger entities such as counties, cities or states. For example, metro areas with greater average implicit bias have larger racial disparities in police shootings. And counties with greater average implicit bias have larger racial disparities in infant health problems. These correlations are important: the lives of Black citizens and newborn Black babies depend on them.

Field experiments demonstrate that real-world discrimination continues and is widespread. White applicants get about 50 percent more callbacks than Black applicants with the same resumes; college professors are 26 percent more likely to respond to a student's e-mail when it is signed by Brad rather than Lamar; and physicians recommend less pain medication for Black patients than white patients with the same injury.

Today managers are unlikely to announce that white job applicants should be chosen over Black applicants, and physicians don't declare that Black people feel less pain than whites. Yet the widespread pattern of discrimination and disparities seen in field studies persists. It bears a much closer resemblance to the widespread stereotypical thoughts seen on implicit bias tests than to the survey studies in which most people present themselves as unbiased.

One reason people on both the right and the left are skeptical of implicit bias might be pretty simple: it isn't nice to think we aren't very nice. It would be comforting to conclude, when we don't consciously entertain impure intentions, that all of our intentions are pure. Unfortunately, we can't conclude that: many of us are more biased than we realize. And that is an important cause of injustice—whether you know it or not. SA

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OPINION

Neuroimaging Our Unconscious Biases

It reveals that they involve the amygdala, the prefrontal cortex, the posterior cingulate and the anterior temporal cortex

By Pragya Agarwal

IF YOU HAVE SEEN THE 2018 DOCUMENTARY *FREE SOLO,* you will be familiar with Alex Honnold. He climbs a rock face without protective equipment of any kind in treacherous landscapes where, above about 15 meters, any slip is generally lethal. Even just watching him pressed against the rock with barely any handholds makes me nauseated. In a functional magnetic resonance imaging (fMRI) test with Honnold, neurobiologist Jane Joseph found there was nearly zero activation in his amygdala. This is a highly unusual brain reaction and may explain why Honnold feels no threat in free solo climbs that others wouldn't dare attempt. The amygdala plays an important role in our legitimate fears but also in our unconscious biases.

Having spent many years researching unconscious bias for my book, I have realized that it remains problematic to pinpoint as it is hidden and is often in complete contrast to what we think we believe. Neuroimaging research is beginning to give us more insight into the formation of our unconscious biases. Recent fMRI neuroscience studies demonstrate that people use different areas of the brain when reasoning about familiar and unfamiliar situations.

The neural zones that respond to stereotypes primarily include the amygdala, the prefrontal cortex, the posterior cingulate and the anterior temporal cortex; they are described as all "lighting up like a Christmas tree" when stereotypes are activated (certain parts of the brain become more activated than others during certain tasks). People also use different areas of the brain when reasoning about familiar and unfamiliar situations. When we meet someone new, we are not merely focusing on our verbal interaction.

Within a few seconds, we turn behaviors into neural signals with identifiable information about the person to form an impression of them, while our prefrontal cortex simultaneously monitors neural information from our five senses, focusing us on social norms or personal preferences. So, while we are evaluating a person, we are also assigning them certain labels and stereotypes. But we are not aware of this, because the prefrontal cortex can engage in this outside our conscious awareness. These decisions are taken on a subconscious level, before we go into the more conscious, slow and controlled processing.

The amygdala is likely to activate as we walk down an unfamiliar dark alleyway and hear unexpected sounds or see a stranger walk toward us. It causes us to make assumptions about the threat level of the situation. We are likely to feel a flood of emotions as our heart starts beat-

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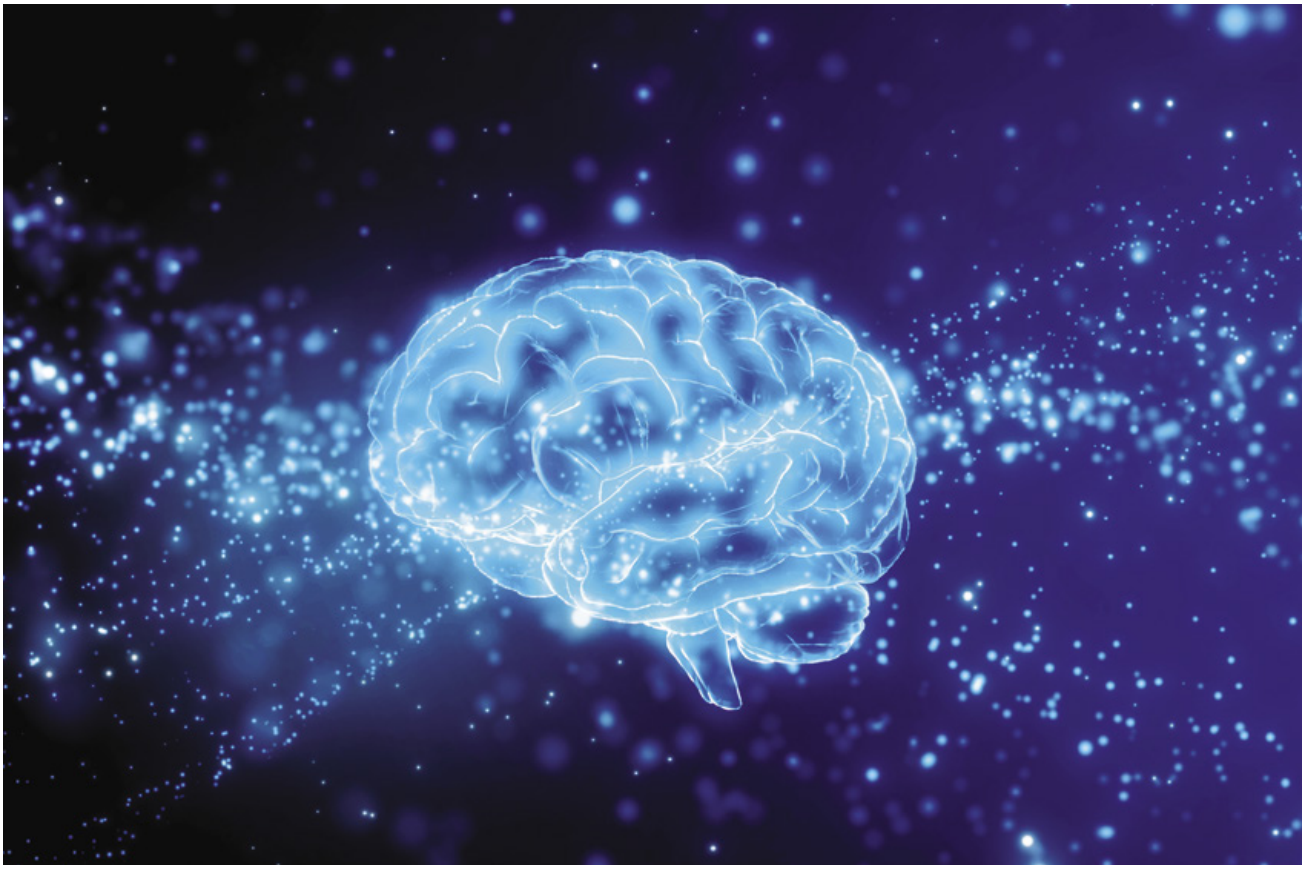

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ing faster and our palms become sweaty. Evolutionarily, humans are primed to respond to any notion of threat to ensure fitness and survival, so this kind of response is crucial. This all happens without any conscious reasoning or effort. It then takes explicit engagement from the prefrontal cortex, which gives out the message to our amygdala that all is under control and there is nothing to worry about, that perhaps that stranger is a neighbor, and that the sound we heard is possibly only an owl.

Our conscious brain does not have the opportunity to interpret all the information that we see, so our initial instincts are less likely to be based on fully processed interpretations and often include biases of some kind. As time passes, our socialization and personal memories and experiences produce unconscious biases and apply them while the amygdala labels and categorizes incoming stimuli efficiently and unconsciously, leading to people rapidly categorizing others as "like me" and "not like me" and consequently "in-group" or "out-group." This, here, is the root of prejudice and discrimination.

Research using fMRI has given us an insight into how we respond to biases at a neural level and how intergroup prejudices activate areas of our brain associated with threat and fear. It has also given us more insight into the way we form in-group favoritism and associations and how negative out-group biases are even more prominent than in-group empathy. We respond more strongly to negative news and information than to positive stimuli.

Results from fMRI show that when individuals see facial images of people of an ethnic background different from their own, it often activates the amygdala more than seeing people of the same ethnicity. The way we respond to different accents can also be explained by amygdala response to in- and out-group memberships. Whereas repetition of our own accent elicits an enhanced neural response, repetition of another group's accent results in reduced neural responses.

Neuroplasticity is one of the major breakthroughs in neuroscience: we now know that different short- and long-term experiences will change the brain's structure. Social attitudes and expectations such as stereotypes can change how the brain processes information, and so brain-based differences in behavioral characteristics and cognitive skills change across time, place and culture. This means that our unconscious biases are not wired into us. They are learned through our experiences and hence can also be unlearned.

The results from these studies are not foolproof, and the limitations of fMRI should be understood and acknowledged. To understand the underlying neural landscape of cognitive biases better, we need to ensure that the absence of activity in a brain region does not necessarily imply that it is not involved in the creation or reinforcement of a specific bias. I believe, however, that it would be of immense benefit if we could translate knowledge about the neurobiology of our underlying behavior into designing interventions for addressing bias, especially that which generates stigma and discrimination. SA

Pragya Agarwal is a behavioral and data scientist, a freelance journalist, and author of the book *Sway: Unravelling Unconscious Bias* (Bloomsbury 2020).

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DEMONSTRATOR marching during the sixth night of protests over the shooting of Daunte Wright by a police officer in Brooklyn Center, Minn., on April 11, 2021.

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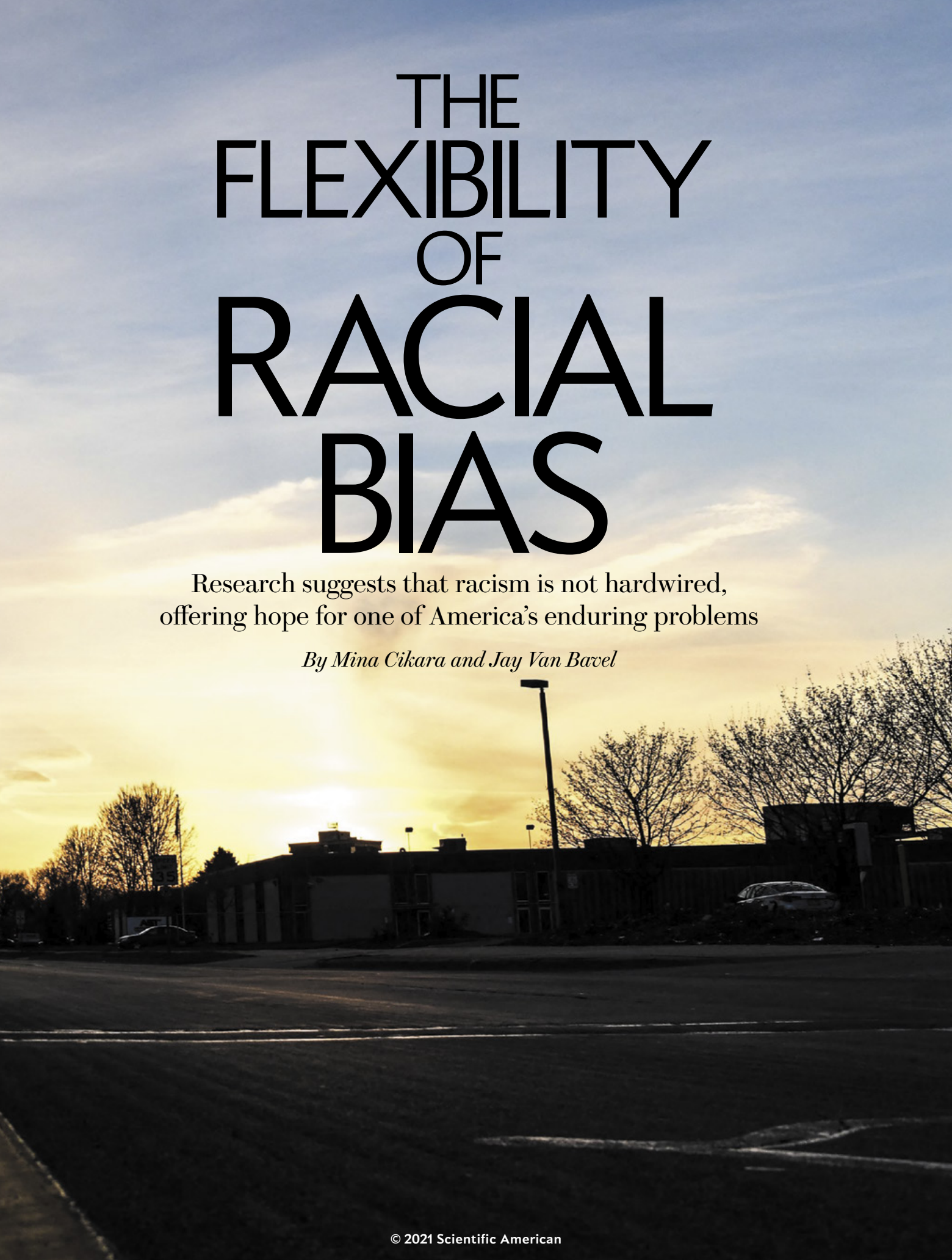
THE FLEXIBILITY OF RACIAL BIAS

Research suggests that racism is not hardwired, offering hope for one of America's enduring problems

By Mina Cikara and Jay Van Bavel



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IN 2013 THE BLACK LIVES MATTER MOVEMENT BEGAN AFTER GEORGE ZIMMERMAN WAS acquitted for shooting Trayvon Martin, a 17-year-old Black teen. The following year the movement triggered national protests after the killing of Michael Brown and Eric Garner. In 2020 the murders of Breonna Taylor and George Floyd led to global protests against racial injustice. These are not isolated incidents. Institutional and systemic racism reinforce discrimination in countless situations, including hiring, sentencing, housing and mortgage lending.

It would be easy to see in all this powerful evidence that racism is a permanent fixture in America's social fabric and even, perhaps, an inevitable aspect of human nature. Indeed, the mere act of labeling others according to their age, gender or race is a reflexive habit of the human mind. Social groupings such as race that we have come to think of as "categories" influence our thinking quickly, often outside of our awareness. Extensive research has found that these implicit racial biases—subconscious negative thoughts and feelings about people from other races—are automatic, pervasive and difficult to suppress. Neuroscientists have explored racial prejudice by exposing people to images of faces while scanning their brains in functional MRI machines. Early studies found that when people viewed faces of another race, the amount of activity in the amygdala—a small brain structure associated with experiencing emotions, including fear—was associated with individual differences on measures of implicit racial bias.

This work has led many to conclude that racial biases might be part of a primitive—and possibly hardwired—neural fear response to racial out-groups. These results, coupled with pervasive discrimination and ongoing violence, paint a bleak picture. But scientists have learned that the amygdala's role in implicit bias is more complex than it first seemed. Moreover, recent findings from psychology and neuroscience have found that individual prejudices and their neural underpinnings are surprisingly flexible. It seems that the key factor in predicting our responses to other groups is not simply their race but rather whether we believe "they" are with us or against us. Group allegiances can turn on a dime, in some cases effectively "erasing race" from people's judgments or creating new classes of enemies (for example, the increase in anti-Muslim hate crimes after 9/11). This new evidence of the flexibility of implicit bias illustrates that we are not hardwired to be racist—and, furthermore, that prejudice can be reduced under the right conditions.

There is little question that categories such as race, gender, age, and other social categories play a major role in shaping the biases and stereotypes that people bring to bear in their judgments of others. But research has found that how people categorize themselves may be just as fundamental to understanding prejudice as how they categorize others. When people categorize themselves as part of a group, their self-concept shifts from the individual ("I") to the collective level ("us"). People form groups rapidly and favor members of their own group even when groups are formed on arbitrary grounds, such as the simple flip of a coin. These findings highlight the remarkable ease with which humans form *coalitions*. And this seems to be a universal human tendency—every culture ever studied displays this same propensity.

Many studies have shown that coalition-based preferences override race-based preferences. For instance, our research has revealed that the simple act of placing people on a mixed-race team can diminish their automatic racial bias. In a series of experiments, white participants who were randomly placed on a mixed-race team—the Tigers or Lions—showed little evidence of implicit racial bias. Merely belonging to a mixed-race team triggered positive automatic associations with all the members of their own group, regardless of race. Being part of one of these seemingly trivial mixed-race groups produced similar effects on brain activity—the amygdala responded to team membership rather than race.

The same dynamic is at play in politics. For example, both Democrats and Republicans in the U.S. favor the resumes of those affiliated with their political party much more than they favor those who share their race. These coalition-based preferences remain powerful even in the absence of the animosity present in electoral politics. Taken together, these studies indicate that momentary changes in group membership can override the influence of race on the way we see, think about and feel toward people who are different from ourselves.

Although these coalition-based distinctions might be the most basic building block of bias, they say little about the other factors that cause group conflict. Why do some groups get ignored while others get attacked? Whenever we encounter a new person or group, we are motivated to answer two questions as quickly as possible: Is this person a friend or foe, and are they capable of enacting their intentions toward me? In other words, once we have determined that someone is a member of an out-group, we need to determine what kind. The nature of the relations between groups—Are they cooperative or competitive, or neither?—and their relative status—Do they have access to resources?—largely determine the course of intergroup interactions.

Groups that are seen as competitive with one's interests, and capable of enacting their opposing intentions, are much more likely to be targets of hostility than more benevolent (elderly) or powerless (homeless) groups. This is one reason why sports rivalries have such psychological potency. For instance, fans of the Boston Red Sox are more likely to feel pleasure, and exhibit reward-related neural responses, at the misfortunes of the arch-rival New York Yankees than other baseball teams (and vice

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versa)—especially in the midst of a tight playoff race. (How much fans take pleasure in the misfortunes of their rivals is also linked to how likely they would be to harm fans from the other team.)

Just as a particular person's group membership can be flexible, so, too, are the relations between groups. Groups that have previously had cordial relations may become rivals (and vice versa). Indeed, psychological and biological responses to out-group members can change, depending on whether or not that out-group is perceived as threatening. For example, people exhibit greater pleasure—they smile—in response to the misfortunes of stereotypically competitive groups (investment bankers); however, this malicious pleasure is reduced when you provide participants with counterstereotypic information (investment bankers who are working with small companies to help them weather an economic downturn). Competition between "us" and "them" can even distort our judgments of distance, making threatening out-groups seem much closer than they really are. These distorted perceptions can serve to amplify intergroup discrimination: the more different and distant "they" are, the easier it is to disrespect and harm them.

Thus, not all out-groups are treated the same: some elicit indifference, whereas others become targets of antipathy. Stereotypically threatening groups are especially likely to be targeted with violence, but those stereotypes can be tempered with other information. If perceptions of intergroup relations can be changed, individuals may overcome hostility toward perceived foes and become more responsive to one another's grievances.

The flexible nature of both group membership and intergroup relations offers reason to be cautiously optimistic about the potential for greater cooperation among groups in conflict (be they Black versus white or citizens versus police). One strategy is to bring multiple groups together around a common goal. For example, in an experiment conducted during the fiercely contested 2008 Democratic presidential primary process, Hillary Clinton and Barack Obama supporters gave more money to strangers who supported the same primary candidate (compared with the rival candidate). Two months later, after the Democratic National Convention, the supporters of both candidates coalesced around the party nominee—Barack Obama—and this bias disappeared.

We have found that creating a sense of cohesion between competitive groups can increase empathy for the suffering of our rivals. These strategies can help reduce aggression toward out-groups, which is critical for creating more chances for constructive dialogue addressing greater social injustices.

Of course, instilling a sense of common identity and cooperation is extremely difficult in entrenched intergroup conflicts, but when it happens, the benefits are obvious. Consider how the community leaders in New York City and in Ferguson, Mo., responded differently to protests against police brutality—in N.Y.C., political leaders expressed grief and concern over police brutality and moved quickly to make policy changes in policing, whereas the leaders and police in Ferguson suppressed protests with high-tech military vehicles and riot gear. In the first case, groups came together with a common goal—to increase the safety of everyone in the community; in the latter, the actions of the police likely reinforced the "us" and "them" distinctions and amplified discord.

Tragically, these types of conflicts continue to roil the country. And the fact that our modern stereotypes and prejudices are tightly linked to historical mistreatment and oppression makes it very hard to find sustainable solutions to these problems. Understanding the psychology and neuroscience of social identity and intergroup relations cannot undo the effects of systemic racism and discriminatory practices; however, it can offer insights into the psychological processes responsible for escalating—or de-escalating—the tension between, for example, civilians and police officers.

Even in cases where it isn't possible to create a common identity among groups in conflict, it may be possible to blur the boundaries between groups. In one recent experiment, we sorted participants into groups—red versus blue—competing for a cash prize. Half of the participants were randomly assigned to see a picture of a segregated social network of all the players, in which red dots clustered together, blue dots clustered together, and the two clusters were separated by white space. The other half of the participants saw an integrated social network in which the red and blue dots were mixed together in one large cluster. Participants who thought the two teams were interconnected with one another reported greater empathy for the out-group players compared with those who had seen the segregated network. Thus, reminding people that individuals could be connected to one another despite being from different groups may be another way to build trust and understanding among them.

A mere month before Freddie Gray died in Baltimore in police custody, President Obama addressed the nation on the 50th anniversary of Bloody Sunday in Selma: "We do a disservice to the cause of justice by intimating that bias and discrimination are immutable or that racial division is inherent to America. To deny … progress—our progress—would be to rob us of our own agency; our responsibility to do what we can to make America better."

Research from psychology and neuroscience indicates that we, as individuals, possess this capacity. Understanding this fact means that we have a responsibility to reduce prejudice and discrimination. Of course, reducing prejudice is not sufficient to usher in racial equality or peace. Even when the level of prejudice against particular out-groups decreases, it does not imply that the level of institutional discrimination against these or other groups will necessarily improve. In many cases, even egalitarian people can perpetuate harm if the systems in place are already unjust.

Ultimately only collective action and institutional evolution can address systemic racism. The science, however, is clear on one thing: individual bias and discrimination are changeable. Race-based prejudice and discrimination, in particular, are created and reinforced by many social factors, but they are not inevitable consequences of our biology. We hope that understanding how coalitional thinking impacts intergroup relations will make it easier for us to affect real social change going forward. SA

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Bias Detectives

As machine learning infiltrates society, scientists are trying to help ward off injustice in algorithms

By Rachel Courtland

Illustration by Mario Wagner

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IN 2015 A WORRIED FATHER ASKED RHEMA VAITHIANATHAN A QUESTION THAT STILL weighs on her mind. A small crowd had gathered in a basement room in Pittsburgh to hear her explain how software might tackle child abuse. Every day the area's hotline receives dozens of calls from people who suspect that a child is in danger; some of these are then flagged by call-center staff for investigation. But the system does not catch all cases of abuse. Vaithianathan and her colleagues had just won a half-million-dollar contract to build an algorithm to help.

Vaithianathan, a health economist who co-directs the Center for Social Data Analytics at the Auckland University of Technology in New Zealand, told the crowd how the algorithm might work. For example, a tool trained on reams of data—including family backgrounds and criminal records—could generate risk scores when calls come in. That could help call screeners to flag which families to investigate.

After Vaithianathan invited questions from her audience, the father stood up to speak. He had struggled with drug addiction, he said, and social workers had removed a child from his home in the past. But he had been clean for some time. With a computer assessing his records, would the effort he had made to turn his life around count for nothing? In other words: Would algorithms judge him unfairly?

Vaithianathan assured him that a human would always be in the loop, so his efforts would not be overlooked. But now that the automated tool has been deployed, she still thinks about his question. Computer calculations are increasingly being used to steer potentially life-changing decisions, including which people to detain after they have been charged with a crime, which families to investigate for potential child abuse and—in a trend called predictive policing—which neighborhoods police should focus on. These tools promise to make decisions more consistent, accurate and rigorous. But oversight is limited: no one knows how many are in use. And their potential for unfairness is raising alarm. In 2016, for instance, U.S. journalists argued that a system used to assess the risk of future criminal activity discriminates against Black defendants.

"What concerns me most is the idea that we're coming up with systems that are supposed to ameliorate problems [but] that might end up exacerbating them," says Kate Crawford, co-founder of the AI Now Institute, a research center at New York University that studies the social implications of artificial intelligence.

With Crawford and others waving red flags, governments are trying to make software more accountable. In December 2017 the New York City Council passed a bill to set up a task force to recommend how to publicly share information about algorithms and investigate them for bias. In 2018 France's president, Emmanuel Macron, said that the country would make all algorithms used by its government open. And in guidance issued in May 2018 the U.K. government called for those working with data in the public sector to be transparent and accountable. Europe's General Data Protection Regulation (GDPR), which came into force at the end of May of that year, is also expected to promote algorithmic accountability.

In the midst of such activity, scientists are confronting complex questions about what it means to make an algorithm fair. Researchers such as Vaithianathan who work with public agencies to try to build responsible and effective software must grapple with how automated tools might introduce bias or entrench existing inequity—especially if they are being inserted into an already discriminatory social system.

"There's a fairly active community of researchers who are trying to develop methods to audit these kinds of systems from the outside," Vaithianathan says.

The questions that automated decision-making tools raise are not entirely new, notes Suresh Venkatasubramanian, a theoretical computer scientist at the University of Utah. Actuarial tools for assessing criminality or credit risk have been around for decades. But as large data sets and more-complex models become widespread, it is becoming harder to ignore their ethical implications, he says. "Computer scientists have no choice

RHEMA VAITHIANATHAN builds algorithms to help flag potential cases of child abuse.

Auckland University of Technology

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but to be engaged now. We can no longer just throw the algorithms over the fence and see what happens."

FAIRNESS TRADE-OFFS

WHEN OFFICIALS at the Department of Human Services in Allegheny County, where Pittsburgh is located, called in 2014 for proposals for an automated tool, they had not yet decided how to use it. But they knew they wanted to be open about the new system. "I'm very against using government money for black-box solutions where I can't tell my community what we're doing," says Erin Dalton, the department's director. The department has a centralized data warehouse, built in 1999, that contains a wealth of information about individuals—including on housing, mental health and criminal records. Vaithianathan's team put in an impressive bid to focus on child welfare, Dalton says.

The Allegheny Family Screening Tool (AFST) launched in August 2016. For each phone call to the hotline, call-center employees see a score between 1 and 20 that is generated by the automated risk-assessment system, with 20 corresponding to a case designated as highest risk. These are families for which the AFST predicts that children are most likely to be removed from their homes within two years or to be referred to the county again because a caller has suspected abuse (the county is in the process of dropping this second metric, which does not seem to closely reflect the cases that require further investigation).

An independent researcher, Jeremy Goldhaber-Fiebert of Stanford University, is still assessing the tool. But Dalton says preliminary results suggest that it is helping. The cases that call-center staff refer to investigators seem to include more instances of legitimate concern, she says. Call screeners also seem to be making more consistent decisions about cases that have similar profiles. Still, their decisions do not necessarily agree with the algorithm's risk scores; the county is hoping to bring the two into closer alignment.

As the AFST was being deployed, Dalton wanted more help working out whether it might be biased. In 2016 she enlisted Alexandra Chouldechova, a statistician at Carnegie Mellon University, to analyze whether the software was discriminating against particular groups. Chouldechova had already been thinking about bias in algorithms—and was about to weigh in on a case that has triggered substantial debate over the issue.

In May 2016 journalists at the news Web site ProPublica reported on commercial software used by judges in Broward County, Florida, that helps to decide whether a person charged with a crime should be released from jail before their trial. The journalists said that the software was biased against Black defendants. The tool, called COMPAS, generated scores designed to gauge the chance of a person committing another crime within two years if released.

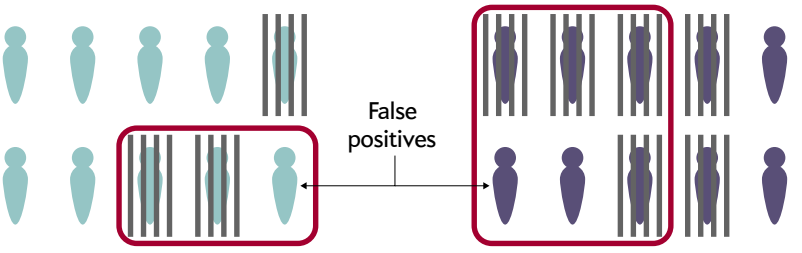
The ProPublica team investigated COMPAS scores for thousands of defendants, which it had obtained through public records

How to Define "Fair"

Researchers studying bias in algorithms say there are many ways of defining fairness, which are sometimes contradictory

Imagine that an algorithm for use in the criminal justice system assigns scores to two groups (*blue* and *purple*) for their risk of being rearrested. Historical data indicate that the purple group has a higher rate of arrest, so the model would classify more people in the purple group as high risk (*top*). This could occur even if the model's developers try to avoid bias by not directly telling their model whether a person is blue or purple. That is because other data used as training inputs might correlate with being blue or purple.

A high-risk status cannot perfectly predict rearrest, but the algorithm's developers try to make the prediction equitable: for both groups, "high risk" corresponds to a two-thirds chance of being rearrested within two years. (This kind of fairness is termed predictive parity.) Rates of future arrests might not follow past patterns. But in this simple example, assume that they do: as predicted, 3 out of 10 in the blue group and 6 out of 10 in the purple group (and two thirds of those labeled high risk in each group) are indeed rearrested (*indicated in gray bars at bottom*).



This algorithm has predictive parity. But there's a problem. In the blue group, 1 person out of 7 (14 percent) was misidentified as high risk; in the purple group, it was 2 people out of 4 (50 percent). So purple individuals are more likely to be false positives: misidentified as high risk.

As long as blue and purple group members are rearrested at different rates, then it will be difficult to achieve predictive parity and equal false-positive rates. And it is mathematically impossible to achieve this while satisfying a third measure of fairness: equal false-negative rates (individuals who are identified as low risk but subsequently rearrested; in the example above, this happens to be equal, at 33 percent, for both purple and blue groups).

Some would see the higher false-positive rates for the purple group as discrimination. But other researchers argue that this is not necessarily clear evidence of bias in the algorithm. And there could be a deeper source for the imbalance: the purple group might have been unfairly targeted for arrest in the first place. In accurately predicting from past data that more people in the purple group will be rearrested, the algorithm could be recapitulating—and perhaps entrenching—a preexisting societal bias. —*R.C.*

Nature

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requests. Comparing Black and white defendants, the journalists found that a disproportionate number of Black defendants were "false positives": they were classified by COMPAS as high risk but were not subsequently charged with another crime.

The developer of the algorithm, a Michigan-based company called Northpointe (now Equivant of Canton, Ohio), argued that the tool was not biased. It said that COMPAS was equally good at predicting whether a white or Black defendant classified as high risk would reoffend (an example of a concept called predictive parity). Chouldechova soon showed that there was tension between Northpointe's and ProPublica's measures of fairness. Predictive parity, equal false-positive error rates and equal false-negative error rates are all ways of being "fair" but are statistically impossible to reconcile if there are differences across two groups—such as the rates at which white and Black people are being rearrested [see box "How to Define 'Fair'" on preceding page]. "You can't have it all. If you want to be fair in one way, you might necessarily be unfair in another definition that also sounds reasonable," says Michael Veale, a researcher in responsible machine learning at University College London.

POLICE IN CAMDEN, N.J., use automated tools to help determine which areas need patrolling.

In fact, there are even more ways of defining fairness, mathematically speaking: at a conference in February 2018, computer scientist Arvind Narayanan gave a talk entitled "21 Fairness Definitions and Their Politics"—and he noted that there were still others. Some researchers who have examined the ProPublica case, including Chouldechova, note that it is not clear that unequal error rates are indicative of bias. They instead reflect the fact that one group is more difficult to make predictions about than another, says Sharad Goel, a computer scientist at Stanford. "It turns out that that's more or less a statistical artifact."

For some, the ProPublica case highlights the fact that many agencies lack resources to ask for and properly assess algorithmic tools. "If anything, what it's showing us is that the government agency who hired Northpointe did not give them a well-defined definition to work with," says Rayid Ghani of Carnegie Mellon. "I think that governments need to learn and get trained in how to ask for these systems, how to define the metrics they should be measuring and to make sure that the systems they are being given by vendors, consultants and researchers are actually fair."

Allegheny County's experience shows how difficult it is to navigate these questions. When Chouldechova, as requested, began digging through the Allegheny data in early 2017, she found that its tool also suffered from similar statistical imbalances. The model had some "pretty undesirable properties," she says. The difference in error rates was much higher than expected across race and ethnicity groups. And for reasons that are still not clear, white children that the algorithm scored as at highest risk of maltreatment were less likely to be removed from their homes than were Black children given the highest risk scores. Allegheny and Vaithianathan's team considered switching to a different model. That could help to reduce inequities, Chouldechova says.

Although statistical imbalances are a problem, a deeper dimension of unfairness lurks within algorithms—that they might reinforce societal injustices. For example, an algorithm such as COMPAS might purport to predict the chance of future criminal activity, but it can only rely on measurable proxies such as being arrested. And variations in policing practices could mean that some communities are disproportionately targeted, with people being arrested for crimes that might be ignored in other communities. "Even if we are accurately predicting something, the thing we are accurately predicting might be the imposition of injustice," says David Robinson, a managing director at Upturn, a nonprofit social justice organization in Washington, D.C. Much would depend on the extent to which judges rely on such algorithms to make their decisions—about which little is known.

Allegheny's tool has come under criticism along similar lines. Writer and political scientist Virginia Eubanks has argued that irrespective of whether the algorithm is accurate, it is acting on biased inputs, because Black and biracial families are more likely to be reported to hotlines. Furthermore, because the model relies on public services information in the Allegheny system—and because the families who use such services are generally poor—the algorithm unfairly penalizes poorer families by subjecting them to more scrutiny. Dalton acknowledges that the available data are a limitation, but she thinks the tool is needed. "The unfortunate societal issue of poverty does not negate our responsibility to improve our decision-making capacity for those children coming to our attention," the county said in a response to Eubanks posted on the AFST Web site in 2018.

TRANSPARENCY AND ITS LIMITS

ALTHOUGH SOME AGENCIES build their own tools or use commercial software, academics are finding themselves in demand for work on public-sector algorithms. At the University of Chicago, Ghani worked with a range of agencies, including the pub-

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lic health department of Chicago, on a tool to predict which homes might harbor hazardous lead. In the U.K., researchers at the University of Cambridge have worked with police in County Durham on a model that helps to identify who to refer to intervention programs, as an alternative to prosecution. And in 2018 Goel and his colleagues launched the Stanford Computational Policy Lab, which is conducting collaborations with government agencies, including the San Francisco District Attorney's Office. Partnerships with outside researchers are crucial, says Maria McKee, an analyst at the district attorney's office. "We all have a sense of what is right and what is fair," she says. "But we often don't have the tools or the research to tell us exactly, mechanically, how to get there."

There is a large appetite for more transparency along the lines adopted by Allegheny, which has engaged with stakeholders and opened its doors to journalists. Algorithms generally exacerbate problems when they are "closed loops that are not open for algorithmic auditing, for review or for public debate," says Crawford of the AI Now Institute. But it is not clear how best to make algorithms more open. Simply releasing all the parameters of a model will not provide much insight into how it works, Ghani says. Transparency can also conflict with efforts to protect privacy. And in some cases, disclosing too much information about how an algorithm works might allow people to game the system.

One big obstacle to accountability is that agencies often do not collect data on how the tools are used or on their performance, Goel says. "A lot of times there's no transparency because there's nothing to share."

Crawford says that a range of "due process" infrastructure will be needed to ensure that algorithms are made accountable. In April 2018 the AI Now Institute outlined a framework for public agencies interested in responsible adoption of algorithmic decision-making tools; among other things, it called for soliciting community input and giving people the ability to appeal decisions made about them.

Many are hoping that laws could enforce such goals. There is some precedent, says Solon Barocas, a researcher who studies ethics and policy issues around artificial intelligence at Cornell University. In the U.S., some consumer-protection rules grant citizens an explanation when an unfavorable decision is made about their credit. And in France, legislation that gives a right to explanation and the ability to dispute automated decisions can be found as early as the 1970s, Veale says.

The big test will be Europe's GDPR, which entered into force on May 25, 2018. Some provisions—such as a right to meaningful information about the logic involved in cases of automated decision-making—seem to promote algorithmic accountability. But Brent Mittelstadt, a data ethicist at the Oxford Internet Institute in England, says the GDPR might actually hamper it by creating a "legal minefield" for those who want to assess fairness. The best way to test whether an algorithm is biased along certain lines—for example, whether it favors one ethnicity over another—requires knowing the relevant attributes about the people who go into the system. But the GDPR's restrictions on the use of such sensitive data are so severe and the penalties so high, Mittelstadt says, that companies in a position to evaluate algorithms might have little incentive to handle the information. "It seems like that will be a limitation on our ability to assess fairness," he says.

The scope of GDPR provisions that might give the public insight into algorithms and the ability to appeal is also in question. As written, some GDPR rules apply only to systems that are fully automated, which could exclude situations in which an algorithm affects a decision but a human is supposed to make the final call. The details, Mittelstadt says, should eventually be clarified in the courts.

AUDITING ALGORITHMS

MEANWHILE RESEARCHERS are pushing ahead on strategies for detecting bias in algorithms that have not been opened up for public scrutiny. Firms might be unwilling to discuss how they are working to address fairness, Barocas says, because it would mean admitting that there was a problem in the first place. Even if they do, their actions might ameliorate bias but not eliminate it, he says, "so any public statement about this will also inevitably be an acknowledgment that the problem persists." Microsoft and Facebook have both announced the development of tools to detect bias.

Some researchers, such as Christo Wilson, a computer scientist at Northeastern University, try to uncover bias in commercial algorithms from the outside. Wilson has created mock passengers who purport to be in search of Uber rides, for example, and has uploaded dummy CVs to a jobs Web site to test for gender bias. Others are building software that they hope could be of general use in self-assessments. In May 2018 Ghani and his colleagues released open-source software called Aequitas to help engineers, policy makers and analysts to audit machine-learning models for bias. And mathematician Cathy O'Neil, who has been vocal about the dangers of algorithmic decision-making, has launched a firm that is working privately with companies to audit their algorithms.

Some researchers are already calling for a step back, in criminal justice applications and other areas, from a narrow focus on building algorithms that make forecasts. A tool might be good at predicting who will fail to appear in court, for example. But it might be better to ask why people don't appear and, perhaps, to devise interventions, such as text reminders or transportation assistance, that might improve appearance rates. "What these tools often do is help us tinker around the edges, but what we need is wholesale change," says Vincent Southerland, a civil rights lawyer and racial justice advocate at New York University's law school. That said, the robust debate around algorithms, he says, "forces us all to ask and answer these really tough fundamental questions about the systems that we're working with and the ways in which they operate."

Vaithianathan, who is now in the process of extending her child-abuse prediction model to Douglas and Larimer Counties in Colorado, sees value in building better algorithms even if the overarching system they are embedded in is flawed. That said, "algorithms can't be helicopter-dropped into these complex systems," she says: they must be implemented with the help of people who understand the wider context. But even the best efforts will face challenges, so in the absence of straight answers and perfect solutions, she says, transparency is the best policy. "I always say: if you can't be right, be honest." SA

An earlier version of this article was published in Nature *in 2018.*

Rachel Courtland is a science journalist based in New York City.

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OPINION

Sexism and Racism Persist in Science

We kid ourselves if we insist that the system will magically correct itself

By Naomi Oreskes

Tempers are running hot in science (as they are in the U.S. at large) as the field embarks on a long-overdue conversation about its treatment of women and people of color. In June 2020, for example, thousands of researchers and academics across the globe—as well as the preeminent journals *Science* and *Nature*—stopped work for a day to protest racism in their ranks. The American Physical Society endorsed the effort to "shut down STEM," declaring its commitment to "eradicating systemic racism and discrimination" in science.

Physics exemplifies the problem. Black people make up about 14 percent of the college-age population in the U.S., commensurate with their numbers in the overall population, but in physics they receive 3 to 4 percent of undergraduate degrees and less than 3 percent of Ph.D.s, and as of 2012 they composed only 2 percent of faculty. No doubt there are many reasons for this underrepresentation, but one troubling factor is the refusal of some scientists to acknowledge that a problem could even exist. Science, they argue, is inherently rational and self-correcting.

Would that were true. The history of science is rife with well-documented cases of misogyny, prejudice and bias. For centuries biologists promoted false theories of female inferiority, and scientific institutions typically barred women's participation. Historian of science and MacArthur fellow Margaret Rossiter has documented how, in the mid-19th century, female scientists created their own scientific societies to compensate for their male colleagues' refusal to acknowledge their work. Sharon Bertsch McGrayne filled an entire volume with the stories of women who should have been awarded the Nobel Prize for work that they did in collaboration with male colleagues—or, worse, that they had stolen by them. (Rosalind Franklin is a well-documented example of the latter: her photographs of the crystal structure of DNA were shared without her permission by one of the men who then won the Nobel Prize for elucidating the double-helix structure.) Racial bias has been at least as pernicious as gender bias; it was scientists, after all, who codified the concept of race as a biological category that was not simply descriptive but also hierarchical.

Good scientists are open to competing ideas; they attend to challenging data, and they listen to opposing views. But scientists are also humans, and cognitive science shows that humans are prone to bias, mis-

OPINION

Anti-Asian Racism in Science

It existed before the pandemic, but COVID has made it worse

By Michael Nguyen-Truong

In the summer of 2020 some people posted a listing for a fake Asian restaurant near my university on Google Maps and Instagram, with a name insulting to Asians and a menu that included horrible-sounding items such as "mouse tail salad" and "marinated ostrich foreheads." The fake name, menu and reviews—even if they were intended as a joke—were all despicable examples of anti-Asian racism that has always been present in the U.S. and has been brought to the forefront amid the COVID outbreak.

Such behavior creates a hostile environment for researchers of Asian ancestry such as myself. It turned out that the Instagram account was linked to students who were predominantly from my college. Knowing that my fellow students have such offensive views has heightened my anxiety, which surfaced early in the pandemic.

Because the disease was first reported in China, I have had to struggle with growing bigotry toward Asians in addition to avoiding the virus itself. There have been many reports about Asians facing verbal and physical attacks, fueled by disturbingly common terms like "Chinese virus" and "kung flu," hate-inspiring language frequently used by former president Donald Trump and others. The Pew Research Center found that Asian-Ameri-

Illustration by Martin Gee

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perception, motivated reasoning and other intellectual pitfalls. Because reasoning is slow and difficult, we rely on heuristics—intellectual shortcuts that often work but sometimes fail spectacularly. (Believing that men are, in general, better than women in math is one tiring example.) It is not credible to claim that scientists are somehow immune to the biases that afflict everyone else.

Fortunately, the objectivity of scientific knowledge does not depend on the objectivity of individual scientists. Rather it depends on strategies for identifying, acknowledging and correcting bias and error. As I point out in my 2019 book, *Why Trust Science,* scientific knowledge begins as claims advanced by individual scientists, teams or laboratories that are then closely scrutinized by others, who may bring forward additional proof to sustain them—or to modify or reject them. What emerges as a scientific fact or established theory is rarely if ever the same as the starting claim; it has been adjusted in light of evidence and argumentation. Science is a collective effort, and it works best when scientific communities are diverse. The reason is simple: heterogeneous communities are more likely than homogeneous ones to be able to identify blind spots and correct them. Science does not correct itself; scientists correct one another through critical interrogation. And that means being willing to interrogate not just claims about the external world but claims about our own practices and processes as well.

Science has an admirable record of producing reliable knowledge about the natural and social world, but not when it comes to acknowledging its own weaknesses. And we cannot correct those weaknesses if we insist the system will magically correct itself. It is not ideological to acknowledge and confront bias in science; it is ideological to insist science cannot be biased despite empirical validation to the contrary. Given that our failings of inclusion have been known for a long time, it is high time we finally fix them. SA

Naomi Oreskes is a professor of the history of science at Harvard University. She is author of *Why Trust Science?* (Princeton University Press, 2019) and co-author of *Discerning Experts* (University of Chicago, 2019).

cans reported a higher level of negative experiences, including racist jokes and slurs or fear of threats or physical attacks, than Black, Hispanic or white respondents in a survey conducted after the pandemic began. Moreover, a Stop Asian American Pacific Islander (AAPI) Hate National Report by the Asian Pacific Policy and Planning Council found more than 2,500 reports of anti-Asian incidents across 47 states in a five-month period (from March to August 2020). Of these, 70 percent involved verbal harassment, and 9 percent of them were physical assaults. More undoubtedly go unreported.

When news of these attacks became public, my family and friends warned me to be alert and careful when I was anywhere outside my home. At the beginning of the pandemic, mask wearing was not required, but to protect people and myself against the spread of the coronavirus, it was something I wanted to do in our laboratory and around campus. But I didn't, because I was told that co-workers and colleagues might avoid or harass me. My family and friends cautioned me not to stay out late and to avoid sparsely populated areas on campus; they and I worried other people might hurt me because I was Asian. I ended up going home early most days, shortening my time for experiments and work.

I endured these limitations because of the xenophobia toward Asians worldwide, but the heightened anxiety became burdensome and made research (as well as nonresearch and leisure activities) more difficult. And I kept quiet about my concerns around the lab because I thought that speaking up could make me a target of jokes among colleagues and lead to alienation and loss of collaboration.

These concerns were magnified because I had faced frequent microaggressions even before the outbreak, such as being asked about where I am "originally from," although I am from the U.S., or if I was related to someone because we shared a common name. Non-Asians too often presume—and say—that my Asian peers and I are pursuing STEM careers because we were forced to by our families. Asians are also often (inaccurately) viewed as the model minority and are falsely thought not to suffer from discrimination.

I am thankful that my institution and college have condemned racist behavior. They contacted Google and Instagram to remove the fake restaurant listing; have expressed concern about and willingness to take action against racism; and are holding journal club discussions and diversity symposiums about race. I deeply appreciate these efforts and the care taken to create a more inclusive and safe space. Institutions in general should require bias training and should develop spaces such as "life issues" groups (my department has one), journal clubs and symposia designed to educate the community about racism. Faculty and administration should welcome discussions about race issues and be more transparent in addressing them. I also think that social media campaigns by institutions have the potential to raise awareness and educate others.

We have a lot of work ahead of us, but inclusion and positive change within our institutions and in STEM are achievable if we unite against racism. Greater inclusion will lead to more sharing of ideas that will help science, technology and medicine flourish, at a time when we dearly need them. SA

Michael Nguyen-Truong is a Ph.D. student at Colorado State University.

Illustration by Jay Bendt

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OPINION

Microaggressions:

DEATH BY A THOUSAND CUTS

The everyday slights, insults and offensive behaviors that people of marginalized groups experience in daily interactions cause real psychological harm

By Derald Wing Sue

My research and work on racial microaggressions began through a series of lifelong experiences and observations of interpersonal racial encounters. For example, I am a second-generation Asian-American, born and raised in the U.S. Yet despite that fact, I receive constant compliments for speaking "good" English. On crowded New York City subway trains, with all seats taken, I noticed that there would always be an empty one next to a Black passenger. These examples and countless incidents are what we call "racial microaggressions."

Microaggressions are the everyday slights, insults, put-downs, invalidations and offensive behaviors that people of marginalized groups experience in daily interactions with generally well-intentioned people who may be unaware of their impact. Microaggressions are reflections of implicit bias or prejudicial beliefs and attitudes beyond the level of conscious awareness. Social psychologists have studied implicit bias for decades, along with the role it plays in human behavior. Almost any marginalized group can be the object of microaggressions. There are racial, gender, LGBTQ and disability microaggressions that occur daily to these groups.

Most individuals who commit microaggressions view themselves as moral and decent human beings

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who never would consciously discriminate against another person. Yet it is important to acknowledge that none of us is immune from inheriting the racial, gender or sexual orientation biases of our society. Let us return to the two opening examples to understand more fully the manifestation, dynamics and impact of microaggressions.

Microaggressions often contain a "metacommunication" or hidden message to the target, which reveals a biased belief or attitude. Although the perpetrator believes that he or she is praising me for speaking good English, the underlying message to me is, "You are a perpetual foreigner in your own country. You are not a true American, because true Americans are light-skinned."

The reluctance to sit next to Black people on the subway is a message that "you are to be avoided because you are potentially dangerous, a criminal or up to no good." Many of my Black friends tell tales of how they enter an elevator with a single white female and how she tenses up, clutches her purse more tightly and moves away in fear.

Microaggressions often convey to targets the message that they are foreigners, criminals, dangerous, a threat or subhuman. Our research labels these messages as themes: for Asian-Americans and Latinx-Americans, that you are a perpetual alien in your own country; for Black people, that you might be a criminal; for people who identify as LGBTQ, that you're a sinner; and, if you're a woman, that you can be sexually objectified.

The saying that "sticks and stones may break my bones, but words will never hurt me" expresses a belief that microaggressions are harmless, small, trivial and insignificant. Critics of microaggression theory believe that we are "making a mountain out of a molehill" and that such incidents are no different from the everyday incivilities that a white person might experience from a rude clerk. Our research, however, reveals major differences that account for their greater harmful and detrimental impact on people of color:

- Microaggressions are constant and continual in the life experience of people of color. They experience these offensive behaviors every day from the moment they awaken in the morning until they go to sleep at night and from the time they are born until they die.
- Microaggressions are cumulative, and any one offense or put-down may represent the straw that breaks the camel's back.
- Microaggressions are constant reminders to people of color that they are second-class citizens.
- Microaggressions are energy-depleting and lead to the concept of "racial battle fatigue."
- Microaggressions symbolize past historic injustices, such as the enslavement of Africans, the taking away of land from the Indigenous people of this country, and the incarceration of Japanese-Americans during World War II.

These distinctions have led psychologists to refer to everyday slights or indignities experienced by people of color as "death by a thousand cuts." Far from being harmless and benign, microaggressions have a macro impact on targets. A whole body of research supports this conclusion. They increase stress in the lives of people of color, lower emotional well-being, increase depression and negative feelings, assail the mental health of recipients, impede learning and problem-solving, impair employee performance and take a heavy toll on the physical well-being of targets. Equally important are findings that microaggressions lower the standard of living of groups of color and create inequities in employment, education and health care.

In closing, I share with you the words of Martin Luther King, Jr., from his "Letter from Birmingham Jail": "We will have to repent in this generation not merely for the hateful words and actions of the bad people but for the appalling silence of the good people." These words have led us to ask an important question: What can well-meaning allies and bystanders do to disarm and dismantle microaggressions they observe?

Our research team at Teachers College, Columbia University, has begun to study and develop antibias education and training strategies called microinterventions. These are the everyday antibias actions that can be taken by targets, parents, significant others, allies and well-intentioned bystanders to counteract, challenge, diminish or neutralize individual and systemic expressions of prejudice, bigotry and discrimination.

We have been able to organize microinterventions into four strategic goals: (1) make the "invisible" visible, (2) educate the perpetrator, (3) disarm the microaggression, and (4) seek outside support and help. For those interested in our latest research venture, much of the information can be found in our 2020 *American Psychologist* article entitled "Disarming Racial Microaggressions: Microintervention Strategies for Targets, White Allies, and Bystanders."

As Dr. King says, silence and inaction in the face of moral transgressions are complicity and collusion. As a society, each of us has a moral responsibility to take action against bias and bigotry. SA

Most individuals who commit microaggressions are well intentioned and experience themselves as moral and decent human beings who never would consciously discriminate. Yet it is important to acknowledge that none of us is immune from inheriting the racial, gender or sexual orientation biases of our society.

Derald Wing Sue is a professor of psychology and education at Teachers College, Columbia University. He is author of *Microaggressions in Everyday Life*, second edition (John Wiley, 2020), and *Microintervention Strategies: What You Can Do to Disarm and Dismantle Individual and Systemic Racism and Bias* (John Wiley, 2020).

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George Floyd's Autopsy and the Structural Gaslighting of America

The weaponization of medical language emboldened white supremacy with the authority of the white coat. How will we stop it from happening again?

By Ann Crawford-Roberts, Sonya Shadravan, Jennifer Tsai, Nicolás E. Barceló, Allie Gips, Michael Mensah, Nichole Roxas, Alina Kung, Anna Darby, Naya Misa, Isabella Morton and Alice Shen

MURAL of George Floyd painted by artists Donkeeboy and Donkeemom on the side of Scott Food Mart in Houston.

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THE WORLD WAS GASLIGHTED BY MISREPORTING ABOUT GEORGE FLOYD'S INITIAL autopsy report. As concerned physicians, we write to deconstruct the misinformation and condemn the ways this weaponization of medical language reinforced white supremacy at the torment of Black Americans.

Gaslighting is a method of psychological manipulation employed to make a victim question their own sanity, particularly in scenarios where they are mistreated. The term comes from a 1938 play and, later, a popular film, wherein a predatory husband abuses his wife in a plot to have her committed to a mental institution. He dims the gas lights in their home; then, when she comments on the darkness, knowingly rejects her observation and uses it as evidence that she's gone insane. It's a torturous tactic employed to destroy a person's trust in their own perception of reality. It's a devastating distraction from oppression. It's insidious. And it happened in 2020 when millions of people who had seen nine agonizing minutes of murder were told by an autopsy report that they hadn't.

In America, widespread anti-Black violence is often paired with structural gaslighting. Racism, after all, thrives when blame for its outcomes are misattributed. When Black families are refused loans in criminally discriminatory housing schemes, their credit is blamed. When youth of color are disproportionately stopped and frisked, they are told the process is random and for their safety.

And when Black people are killed by police, their character and even their anatomy are turned into justification for their killer's exoneration. It's a well-honed tactic. One analysis of the national database of state-level death certificate data found that fewer than half of law-enforcement-related deaths were reported. In addition to this undercounting, police actions were further minimized by the use of diagnostic codes that incorrectly labeled the cause of death as "accidental" or "undetermined" rather than police-related. For centuries, our systems have relied on this psychological torture—a host of mental gymnastics—to deny the truth of what Black people have always known. The cause of death is racism.

On May 29, 2020, the country was told that the autopsy of George Floyd "revealed no physical findings that support a diagnosis of traumatic asphyxiation" and that "potential intoxicants" and preexisting cardiovascular disease "likely contributed to his death." This requires clarification. These phrases, often quoted in media reports, did not come from a physician but were taken from the criminal charge complaint against Chauvin, which utilized politicized interpretations of medical information. As doctors, we wish to highlight for the public that this framing of the circumstances surrounding Floyd's death was, at best, a misinterpretation and, at worst, a deliberate obfuscation.

A time line of events illustrates how a series of omissions and commissions regarding Floyd's initial autopsy results deceptively fractured the truth. On May 28, a statement released by the Hennepin County Medical Examiner's office reported ongoing investigations and acknowledgement from the forensic pathologist that an "autopsy ... must be interpreted in the context of the pertinent investigative information." As per standardized medical examination, Floyd's underlying health conditions and toxicology screen were documented during the autopsy. These are ordinary findings that do not suggest causation of death. The May 29 criminal complaint against Chauvin and ensuing headlines falsely overstated the role of Floyd's coronary artery disease and hypertension, which increase the risk of stroke and heart attack over years, not minutes. As-

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phyxia—suffocation—does not always demonstrate physical signs, as other physician groups have noted.

Without this important medical context, however, the public was left to reconcile manipulated medical language with the evidence they had personally witnessed. Ultimately the charging document overstated and misrepresented the role of chronic medical conditions, inappropriately alluded to intoxicants, and failed to acknowledge the stark reality that but for the defendant's knee on George Floyd's neck, he would not be dead today.

By Monday, June 1, in the context of widespread political pressure, the public received two reports: the preliminary autopsy report by private doctors commissioned by Floyd's family and—shortly thereafter—a summary of the preliminary autopsy from the Hennepin County Medical Examiner's Office. Both reports stated that the cause of Floyd's death was homicide: death at the hands of another.

By inaccurately portraying the medical findings from the autopsy of George Floyd, the city of Minneapolis and media emboldened white supremacy, all under the cloak of authoritative scientific rhetoric. They took standard components of a preliminary autopsy report to cast doubt, to sow uncertainty—to gaslight America into thinking we didn't see what we know we saw. In doing so, they perpetuated stereotypes about disease, risky behavior and intoxication in Black bodies to discredit a victim of murder. This state of affairs is not an outlier—it is part of a patterned and tactical distortion of facts wherein autopsy reports are manipulated to bury police violence and uphold white supremacy. As Ida B. Wells said, "Those who commit the murders write the reports." A similar conflict of interest between police departments and medical examiners offices continues today.

As physicians, we will not be complicit in the ongoing manipulation of medical expertise to erase government-sanctioned violence. Although we are relieved that two independent examinations invalidated the preliminary findings in the charging document and the headlines that deceitfully undermined police officer Derek Chauvin's culpability in Floyd's murder, our initial incense is not replaced by celebration.

For three days, Black Americans sat—and still sit—with the all too familiar pangs of being told that the truth is not true. Of fearing that the law would believe a physician's report over the reality they saw with their own eyes and have lived with their own lives. It's a miscarriage of justice that deepens the cut; not only can Black people be killed with impunity; a physician's autopsy report can be twisted to replace the truth.

Medical science has long been used for the consolidation of power rather than for delivering justice and help for the oppressed. We see how Black mothers are blamed for their own mortality in childbirth and how starkly high rates of COVID death in Black communities are preposterously misattributed to differences in hormone receptors or clotting factors, all the while letting racism off the hook.

We wish to remind fellow physicians that medical science has never been objective. It has never existed in a vacuum; there have and will always be social, political and legal ramifications of our work. Our assessments may be employed in criminal justice cases; our toxicology screens may have profound effects on the livelihood of patients; our diagnoses may perpetuate sexist and racist stereotypes. Our lack of ill intent cannot be our alibi: we must be accountable for not just our work but also how it is used, lest our medicine become the very weapon that harms. Medicine requires inclusion of the social context of disease to uphold its sacred oath of doing no harm. If we focus only on molecular pathways and neglect to articulate the role of structural inequities—of racism—in our country, our reports on the causes of death and injury in our patients will erase the roles of their oppressors.

We also write to remind our physician colleagues that the medical field is a place ripe for gaslighting. Bolstered by the perceived strength and legitimacy of a white coat and a stethoscope, our diagnoses and conclusions—about physical or psychological "abnormalities," about causes of illness and death—have the power to eclipse reality, as we've seen in the case of George Floyd. Often we stand by while other agents co-opt our frameworks, obscure our research and weaponize our language in the service of oppression.

The declarations, the truths, the realities of Black people in America are too often disregarded. Across the nation, Black people are suffocating under the weight of anti-Black hatred. They cannot breathe. And even as they gasp for air, structural gaslighting operates to deny the truths of the causes of their suffocation.

We write as physicians to denounce this psychological manipulation. We write to apologize for the discrimination our patients of color have received in the hospital under our watch, we write in gratitude for the tireless labor of Black activists, and we write to condemn how medicine has been weaponized in the service of white supremacy. We write to validate what Black people already know—have always known—that racism is a most pressing public health crisis. We pledge to fight this crisis as if our own breath depended on it. SA

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Editor's Note: The trial of Derek Chauvin, the former Minneapolis police officer charged in the death of George Floyd, began with the defense arguing that Floyd died of underlying medical conditions and drug use. This contradicts two autopsy reports—one by the Hennepin County Medical Examiner's Office and the other by private doctors commissioned by Floyd's family—that ruled the cause of death was homicide. This story from June 2020, written by 12 physicians, explains how inaccurately portraying the medical findings from Floyd's autopsy emboldens white supremacy under the cloak of authoritative scientific rhetoric. On April 20, 2021, Chauvin was convicted of second-degree murder, third-degree murder and second-degree manslaughter.

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THE BRILLIANCE TRAP

How a misplaced emphasis on genius subtly discourages women and Black people from entering certain academic fields

By Andrei Cimpian and Sarah-Jane Leslie

Illustrations by Allison Seiffer

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IN THE 1980S PHILOSOPHERS WOULD SOMETIMES SPEAK OF "THE BEAM"—A METAPHORICAL spotlight of intellectual brilliance that could illuminate even the most complex philosophical conundrums. Only some lucky philosophers were ever born with the Beam, and their work represented the gold standard of the field. Anyone who lacked the Beam was forever condemned to trail behind them intellectually.

One of us (Leslie) would share this sort of story whenever we would see each other at conferences. The two of us were trained in different disciplines (Leslie in philosophy and Cimpian in psychology), but we studied similar topics, so we would get together regularly to catch up on research and talk about our experiences as members of our respective fields. Psychology and philosophy are quite similar in their substance (in fact, psychology was a branch of philosophy until the mid-1800s), but the stories we told painted a picture of two fields with vastly different views on what is important for success. Much more so than psychologists, philosophers value a certain kind of person—the brilliant superstar with an exceptional mind. Psychologists, in contrast, are relatively more likely to believe that the leading lights in their field grew to achieve their positions through hard work and experience.

At first, we viewed philosophy's obsession with brilliance as a quirk—a little strange but innocuous. Other things seemed to present bigger problems in Leslie's field, such as its inability to attract women and minorities. Despite sustained attention to issues of underrepresentation in recent years and some efforts to alleviate them, women still accounted for fewer than 30 percent of the doctoral degrees granted in philosophy in 2015, and Black people made up only 1 percent of philosophy Ph.D.s. The field of psychology, in contrast, has been quite successful in attracting and retaining women (72 percent of newly minted Ph.D.s), and Black people held 6 percent of its 2015 doctoral degrees. Admittedly, these figures still fall short of their share of the general population, but they are nonetheless six times the ratio in philosophy.

We could not wrap our minds around the discrepancy. Our fields have so much in common—both philosophers and psychologists ask questions about how people perceive and understand the world, how they decide between right and wrong, how they learn and use language, and so on. Even the few salient differences—such as psychologists' greater use of statistics and randomized experiments—are becoming blurred nowadays with the huge increase in the popularity of experimental philosophy, in which philosophers conduct surveys and experiments to explore different perspectives on morality, for example. How could two such closely related fields be so vastly different in membership?

A BRILLIANT IDEA

THE CLOSEST THING either of us has ever had to a eureka moment came several years ago when we connected two threads running through the anecdotes we had been sharing. We were having dinner with a group of philosophers and psychologists at a conference, and the conversation happened to turn, in quick succession, from philosophers' infatuation with brilliance to the gender gap in their field. This chance juxtaposition brought to mind for us a connection we had never considered before: maybe the premium that philosophers place on brilliance is actually the reason so few of their colleagues are women or minorities. We did not discount the benefits of brilliance. Rather we wondered whether genius was more easily overlooked in women and Black people. Could it be that insistence on the need for a keen intellect in a particular field was tantamount to hanging a "Keep Out" sign to discourage any newcomers who did not resemble that field's current members?

On the surface, an emphasis on brilliance does not favor one group over another; cognitive ability is not intrinsically tied to gender or race. Philosophers seek a certain quality of mind—regardless of whose mind it is. This seemingly logical preference quickly becomes problematic, however, in light of certain shared societal notions that incorrectly associate superior intellect with some groups—for example, white males—more than others.

Even among the academics present that night, one of the views expressed was that men and women just thought differently. Women were alleged to be more practical and anchored in reality, whereas men were more willing to engage in the kind of counterfactual, abstract reasoning that is viewed as a sign of philosophical brilliance. We started to wonder whether such stereotypes, which amount to equating brilliance with men, might well dissuade women from entering a field that holds this quality in high esteem. Moreover, current members of such a field might themselves hold different expectations about the prospects of men and women and might evaluate and encourage them differently as a result. The same logic extends to race: our country has a long history of portraying Black people as intellectually inferior, which is particularly likely to affect their participation in a field that focuses so single-mindedly on the quality of one's intellect. Considering these stereotyped atti-

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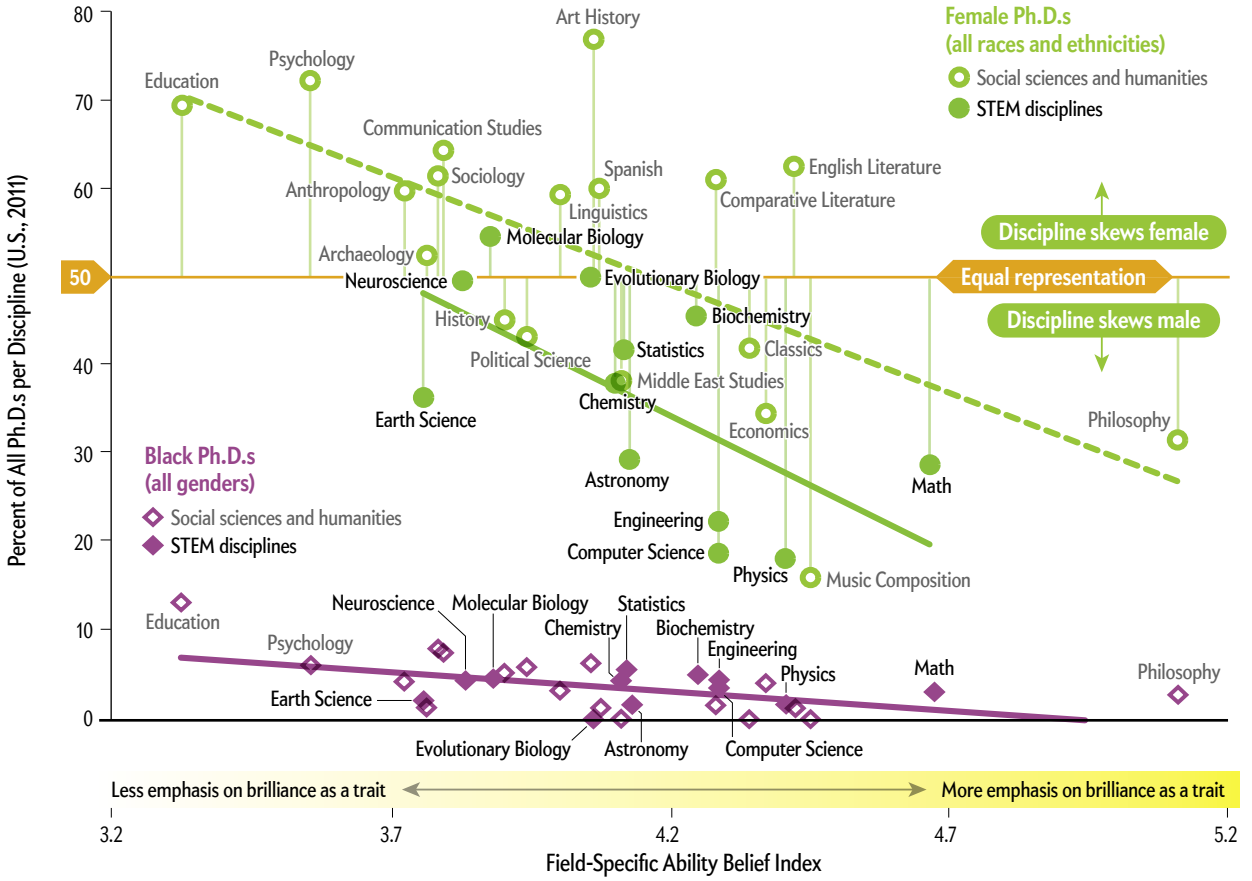
How Stereotypes about Genius Affect Women and Black People in Academia

A survey of almost 2,000 professionals in 30 academic fields determined how strongly they believed that the trait of brilliance, as measured by a so-called field-specific ability belief index, mattered for success in their discipline. Fields with higher scores, such as physics, math and philosophy, awarded fewer advanced degrees to women and Black people compared with neuroscience and psychology, which scored lower. The results suggest that many fields implicitly equate brilliance with white males.



tudes, which are unsupported by science, philosophy's fascination with brilliance may have a real impact on its diversity.

Later that night the two of us talked about our insight. We speculated about whether its implications extend beyond our home disciplines. Talk of brilliance is common in academia and—it seemed to us—quite common in fields that have similar issues with diversity, such as science, technology, engineering and mathematics. Might our anecdotal comparison of philosophy and psychology have something new to say about the underrepresentation of women and minorities in these disciplines?

The more we thought about it, the more we realized that our brilliance hypothesis might also explain some of the variability in gender and race gaps *among* different scientific fields. For example, women make up nearly 50 percent of doctoral degrees in biochemistry but just slightly more than 30 percent of Ph.D.s in organic chemistry. The difference cannot easily be explained by the content of the fields, in which there is considerable overlap, or by their history—biochemistry emerged from organic chemistry at about the same time psychology separated out of philosophy as an independent discipline. We wondered whether the demographic differences between such sibling subjects, as well as more generally among scientific fields, could be explained in part by the extent to which they emphasize exceptional intellectual talent as the key to success.

SUCCESSFUL MINDSETS

OUR EARLY CONJECTURES quickly reminded us of the rich body of work developed by psychologist Carol S. Dweck of Stanford University. Dweck and her colleagues have shown that one's beliefs about ability matter greatly for one's ultimate success. A person who sees talent as a stable trait (a "fixed mindset" in Dweck's terminology) is motivated to show off this aptitude and avoid mistakes, which presumably reflect the limits of that gift. In contrast, a person who adopts a "growth mindset" sees his or her

Source: "Expectations of Brilliance Underlie Gender Distributions across Academic Disciplines," by Sarah-Jane Leslie et al., in *Science*, Vol. 347; January 16, 2015

Graphic by Jen Christiansen

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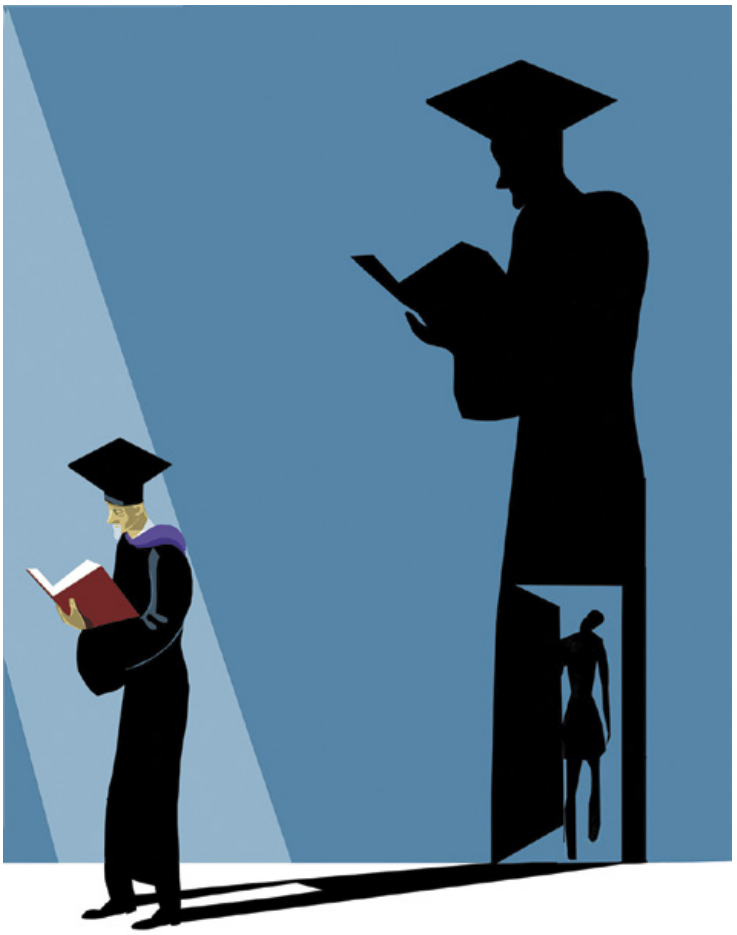

current capacity as a work in progress. In other words, ability is a malleable quantity that can usually be increased with more effort and better strategies. For a person with a growth mindset, mistakes are not an indictment but rather a valuable signal highlighting which of their skills are in need of work.

Although Dweck initially studied mindsets in individuals, she and Mary Murphy, now at Indiana University Bloomington, recently suggested that organized groups of people, such as companies and clubs, may also hold these sorts of views. We took that idea a step further and considered whether they might permeate entire disciplines as well. The fascination with brilliance in philosophy and other areas could conceivably create an atmosphere in which displays of intellectual prowess are rewarded and imperfections are to be avoided at all costs. In combination with the stereotypes suggesting that genius is unevenly distributed across groups, such a field-wide perspective could easily turn toxic for members of stereotyped groups, such as women or Black people. After all, it is easy to "see" imperfections and inadequacies in those people whom you expect to have them.

Several long phone conversations later, we had a tentative plan for putting our ideas to the test. We would contact academic professionals from across a wide range of disciplines and ask them whether they thought that some form of exceptional intellectual talent was necessary for success in their field. We would then look up statistics on the gender and racial/ethnic composition of the people obtaining Ph.D.s in these disciplines, which the National Science Foundation freely supplies on its Web site. If our hunch was correct, we should see that those disciplines that place more value on brilliance would tend to have fewer female and Black Ph.D.s. This pattern should hold not just at the macro level—when comparing the hard sciences, for example, with the social sciences and the humanities—but also *within* these broad domains for disciplines as similar as philosophy and psychology.

More than a year and thousands of e-mailed surveys later, we and our collaborators Meredith Meyer of Otterbein University in Ohio and Edward Freeland of Princeton University finally had an answer to some of our questions. Equal parts relieved and exhilarated, we saw that the answers received from almost 2,000 academics across 30 fields matched the distribution of Ph.D.s in the way we had expected. Fields that placed more value on brilliance also conferred fewer Ph.D.s on women and Black candidates. The greater the emphasis on this single fixed trait, the fewer doctoral degrees were awarded to either of these groups. The proportion of female and Black Ph.D.s in psychology, for example, was higher than the parallel proportions for philosophy, math or physics.

Next, we separated the responses in the physical and biological sciences from those in the humanities and social sciences. Analyses of these subgroups indicated that a stronger emphasis on brilliance correlated with fewer female and Black Ph.D.s regardless of whether we compared physics with biology or philosophy with sociology. It seemed that we had stumbled onto an explanation that was general enough to describe the representation of multiple stereotyped groups in fields across the entire academic spectrum.

ALTERNATIVE IDEAS

OUR EXCITEMENT ABOUT THESE DATA ASIDE, all we had really shown at this point was a correlation between the presumed desirability of a fixed trait—brilliance—and a dearth of women or Black people in a given field. We had not yet demonstrated cause and effect. Certainly many other plausible explanations for the gender imbalances have been proffered over the years—from a heavier workload that favored single men and those with wives who did not work outside the home to a supposed female preference for working with living organisms, as opposed to inanimate objects. We needed to determine whether we were bringing something new to the table—perhaps our explanation reduced to one that had been previously offered.

We carefully examined the most common alternatives. For instance, did our brilliance measure simply track differences between fields in their reliance on math? We looked at the math portion of incoming students' Graduate Record Examinations (GREs) as a proxy. Beliefs about brilliance still predicted women's representation above and beyond those scores. Similarly, we found no support for the common view that women are underrepresented in "high-powered fields" because they prefer a better

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work-family balance. We asked the academics in our sample how many hours they worked per week—both on- and off-campus. Taking into account these differences in workload did not, however, reduce the explanatory power of beliefs about brilliance; this single variable still predicted the magnitude of gender gaps across the 30 disciplines. We also considered the prevalent thought that women might be more interested in working with (and have a better intuitive understanding of) people, whereas men prefer inanimate systems. But an analysis of the many branches of philosophy, for example, that do in fact consider people—and are still dominated by men—basically blew that idea out of contention.

As often happens in research, this initial study made it clear to us how much we did *not* yet know about the phenomenon that we were investigating. For example, we realized it would be important to know if academics' beliefs about brilliance predict gender and race gaps at earlier points in students' educational trajectories. We were very interested in testing our idea at the bachelor's level, which is the gateway to students' later careers. Do field-level messages about the importance of brilliance relate to the majors that young women and Black students ultimately pursue?

The answer to this question is yes, as we reported in *PLOS ONE* in 2016 when we analyzed anonymous student evaluations of their college instructors on RateMyProfessors.com. We found that undergraduates were nearly twice as likely to describe male professors as "brilliant" or a "genius" compared with female professors. In contrast, they used such terms as "excellent" or "amazing" equally often for men and women on the popular Web site. We determined that the overall amount of talk about brilliance and genius in the student reviews (which is a proxy for a field's emphasis on these qualities) correlated closely with a lack of diversity in completed majors.

ORIGINS OF STEREOTYPES

FURTHER INVESTIGATION showed that nonacademics share similar notions of which fields require brilliance. Exposure to these ideas at home or school could discourage young members of stereotyped groups from pursuing certain careers (such as those in science or engineering) before they even set foot on a college campus.

At this point, we realized we needed to investigate the acquisition of these stereotypes. When do young people in our culture start thinking that some groups have more brilliant people in them? On the one hand, it could be that this stereotype emerges late in development, after sustained exposure to relevant cultural input (for example, media portrayals of brilliance and gender-biased expectations from parents, teachers, professors and peers). On the other hand, evidence from developmental psychology suggests that children are cultural sponges—incredibly sensitive to signals in their social environments. In fact, youngsters in the early elementary grades seem to have already absorbed the stereotypes that associate math with boys and reading with girls. From this perspective, we might expect that stereotypes about brilliance would also be acquired early in life.

To explore this idea, we asked hundreds of five-, six- and seven-year-old boys and girls many questions that measured whether they associated being "really, really smart" (our child-friendly translation of "brilliant") with their gender. The results, which we published in 2017 in *Science,* were consistent with the literature on the early acquisition of gender stereotypes yet were still shocking to us. Male and female five-year-olds showed no difference in their self-assessment. But by age six, girls were less likely than boys to think that members of their gender are "really, really smart."

Finding these stereotypes so early in childhood made us ask whether they might already begin to constrain boys' and girls' interests. We introduced another group of five-, six- and seven-year-olds to unfamiliar gamelike activities that we described as being "for children who are really, really smart." We then compared boys' and girls' interest in these activities at each age. The results revealed no gender differences at age five but significantly greater interest from boys at six and seven years of age—which is exactly where we saw the stereotypes emerge. In addition, the children's own stereotypes directly predicted their interest in these novel activities. The more a child associated brilliance with the opposite gender, the less interested he or she was in playing our games for "really, really smart children." This evidence suggests an early link between stereotypes about brilliance and children's aspirations. Over the rest of childhood development, this link may funnel many capable girls away from disciplines that our society perceives as being primarily for brilliant people.

The hard work of figuring out how best to put all this information to use—how to intervene—lies ahead of us. But a few suggestions follow pretty directly from the evidence we have so far. Minimizing talk of genius or brilliance with students and protégés may be a relatively easy and effective way of making one's field more welcoming for members of groups that are negatively stereotyped in this respect. Given current societal stereotypes, messages that portray this trait as singularly necessary may needlessly discourage talented members of stereotyped groups. The changes may need to go a little deeper than talk, however, and tackle some of the entrenched, systemic issues that accompany a field's fascination with brilliance. Refraining from mentioning the Beam will not help young women in philosophy if the rest of the field's practices continue to be implicitly anchored in the idea that brilliance is all that matters.

Another key takeaway is that we may need to intervene earlier than conventional wisdom suggests. Our developmental data indicate that some of the psychological processes that work against diversity in fields that value brilliance can be traced all the way back to elementary school. Waiting until college to step in and ensure that all young people have a fair shot at finding the careers that might suit them no longer seems like the best-timed intervention—we as a society would be wise to encourage a growth perspective, as opposed to a fixed-trait mindset, in young children as well. SA

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FRIENDLY FIELDS

Of the 17,505 doctorates awarded in science and engineering to women in the U.S. in 2015,

40%

were given in the life sciences

Of the 1,307 such doctorates granted to Black students, more than

40%

were in psychology and the social sciences

Source: *Doctorate Recipients from U.S. Universities: 2015.* National Center for Science and Engineering Statistics. National Science Foundation, 2017

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The Harm That Data Do

Paying attention to how algorithmic systems impact marginalized people worldwide is key to a just and equitable future

By Joanna Redden

IN AUSTRALIA, THEY CALL IT "ROBO DEBT": AN AUTOMATED DEBT-RECOVERY system that is generating fear, anxiety, anger and shame among those who rely on, or who have relied on, social support. In 2016 the country's Department of Human Services introduced a new way of calculating the annual earnings of welfare beneficiaries and began dispatching automated debt-collection letters to those identified as having been overpaid. The new accounting method meant that fortnightly income could be averaged to estimate the income for an entire year—a problem for those with contract, part-time or precarious work. Reports indicate that the system went from sending out 20,000 debt collection notices a year to sending up to that many every week.

Previously, when the system identified someone who may have been overpaid benefits, a human was tasked with investigating the case. Under the automated system, however, this step was removed; instead it became the responsibility of the recipients to prove that they had not. That meant finding out why they were targeted—often requiring hours on the phone—and digging up copies of pay slips from as far back as seven years. To make matters worse, many of the debt notices were sent to people already living in difficult situations. Those targeted felt powerless because they had little time or resources to challenge the system. Newspapers reported at least one suicide. A social service orga-

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nization eventually reported that a quarter of the debt notices it investigated were wrong, and an Australian senate inquiry concluded that "a fundamental lack of procedural fairness" ran through the entire process.

We have entered an "age of datafication" as businesses and governments around the world access new kinds of information, link up their data sets, and make greater use of algorithms and artificial intelligence to gain unprecedented insights and make faster and purportedly more efficient decisions. We do not yet know all the implications. The staggering amount of information available about each of us, combined with new computing power, does, however, mean that we become infinitely knowable—while having little ability to interrogate and challenge how our data are being used.

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At the Data Justice Lab at Cardiff University in Wales, we maintain a Data Harm Record, a running log of problems with automated and algorithmic systems being reported from across the globe. We analyze this record to understand the diverse ways in which such systems are going wrong, how citizen's groups are dealing with the emerging problems, and how agencies and legal systems are responding to their challenges. Our studies, we hope, will result in a deeper understanding of how democratic institutions may need to evolve to better protect people—in particular, the marginalized—in the age of big data.

DEEPENING INEQUALITY

THE ROBO-DEBT SCANDAL is one of many that demonstrate the power imbalance incorporated into many emerging data systems. To understand what happened, we need answers to such questions as why a system with such high error rates was introduced without adequate due process protections for citizens, why robust impact assessments were not done before it was rolled out, why the needs of those affected were not fully considered in designing the online portal or helpline, and why it was deemed permissible to remove human oversight. The problems with it, and with many other data-driven systems, stem in significant part from underlying social and political contexts—specifically, long-standing binaries of "deserving" and "undeserving" citizens that influence how they are valued and treated.

Some amount of error is inevitable in automated systems, as mathematician Simon Williams of the University of Melbourne in Australia pointed out with regard to the robo-debt case: there always will be false positives and false negatives. Even so, seemingly random mistakes sometimes turn out to be discriminatory in nature. For example, face-recognition technologies routinely fail to identify nonwhite faces—which is a problem when that influences your ability to travel or to access government services. Joy Buolamwini, founder of the Algorithmic Justice League at the M.I.T. Media Lab, argues that this happens, in part, because the machine-learning algorithms are trained on data sets containing mainly white faces. Employees at the high-tech firms that designed these systems are, mostly, white—an imbalance that can limit the ability to spot and address bias.

Likewise, an investigation by news organization ProPublica discovered that algorithms predicting the likelihood that someone charged with a crime would reoffend were twice as likely to falsely rank Black defendants as high risk than white defendants. Similar scoring systems are being used across the U.S. and can influence sentencing, bonds and opportunities to access rehabilitation instead of jail. Because the models are proprietary, it is difficult to know why this happens, but it seems to be connected to weights the algorithms assign to factors such as employment, poverty and family history. Data drawn from a world that is unequal will reflect that inequality and all too often end up reinforcing it.

Disturbingly, researchers find that those at the top—the designers and the administrators—routinely fail to appreciate the limitations of the systems they are introducing. So, for example, the underlying data sets might contain errors, or they could have been compiled from other data sets that are not particularly compatible. Often, too, the implementers are unaware of bureaucratic or infrastructural complexities that can cause problems on the ground. They routinely fail to assess the impact of the new systems on the marginalized or to consult with those who do have the necessary experience and knowledge. When algorithms replace human discretion, they eliminate corrective feedback from those affected, thereby compounding the problem.

At other times, harm results from the way big data are used. Our data "exhaust"—the data we emit as we communicate online, travel and make transactions—can be combined with other data sets to construct intimate profiles about us and to sort and target us. People can be identified by religion, sexual preferences, illnesses, financial vulnerability, and much more. For example, World Privacy Forum's Pam Dixon found data brokers (the companies that aggregate and sell consumer data) offering a range of problematic lists, such as of individuals suffering from addictive behavior or dementia and rape victims, among others. Researchers studying the financial crash of 2008 found that banks had combined offline and

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online data to categorize and influence customers. In 2012 the U.S. Department of Justice reached a $175-million settlement with Wells Fargo over allegations that it had systematically pushed Black and Hispanic borrowers into more costly loans.

Overall, the kinds of damage that data systems can cause are incredibly diverse. These may include loss of privacy from data breaches; physical injury as workplace surveillance compels people to take on more than they can; increased insurance and interest rates; and loss of access to basic essentials such as food, home care and health care. In unequal societies, they serve to further embed social and historical discrimination.

DISSENT AS NECESSITY

WHAT HAPPENS when people try to challenge data harms? To date, we have investigated cases involving governmental use of new data systems in Australia, Canada, the Netherlands, New Zealand, the U.K. and the U.S. Even in these democratic societies, relying on legal systems alone is usually not enough. Citizens are trying to obtain a measure of redress by combining their time and other resources into a collective and multipronged effort that includes all the pillars of democracy.

In the robo-debt case, those affected created a Not My Debt campaign for publishing their stories anonymously, getting help and sharing resources. According to Dan Nicholson, Victoria Legal Aid's executive director of criminal law, the organization has yet to initiate a federal court challenge, in part because people are reluctant to go public after the Department of Human Services released the private details of one critic to the press. One of his biggest concerns is how the government shifted responsibility to individual citizens for proving that no debt is owed, despite its vastly superior ability to compile evidence. The department says it has made changes to the system in response to early critiques, but experts say these are not enough.

In the Netherlands, individuals and organizations came together to launch a district court challenge against the government over Systeem Risico Indicatie (SyRI), which links citizen data to predict who is likely to commit fraud. The litigants argued that the system violates citizens' rights by treating everyone as guilty until proven innocent. This court case is likely to inspire citizens in other democracies seeking to protect their rights and to expand the definitions of harm. In the U.K., groups such as defenddigitalme are raising concerns about the psychological and social impact of Web-monitoring software in schools and the ways it can damage students who are wrongly labeled, for instance, as being suicidal or as gang members. In New Zealand, nongovernmental organizations (NGOs) successfully blocked an attempt by the Ministry of Social Development to require all providers of social services to provide data about their clients to receive government funding. The NGOs argued that the requirement could prompt members of already marginalized groups, such as refugees or victims of domestic violence, to avoid help for fear of being identified.

In Little Rock, Ark., an algorithm introduced by the state's Department of Human Services was blamed for unjustly cutting the home care hours of people with severe disabilities. Earlier, home care nurses determined home care hours. After the change, they helped people fill out a questionnaire and entered the data into a computer system—and the algorithm decided. Government representatives argued that the automated system ensures that assignments of home care hours are fair and objective. Some individuals strongly disagreed, and with the help of Legal Aid of Arkansas, seven of them took the department to court. Six had seen their weekly home care hours cut by more than 30 percent. Court documents make for grim reading, with each plaintiff recounting the impact of the cuts on their life and health.

Examining information about the algorithm extracted via a court order, Legal Aid of Arkansas lawyer Kevin De Liban found numerous problems with it and how it was implemented. In May 2018 a judge ordered the Department of Human Services to stop using it, but the agency refused—whereupon the judge found the department in contempt. The legal battle continued, with the quality of life of thousands hanging in the balance.

These cases speak to the importance of collective mobilization in protecting people from injustices committed via data systems. It is difficult for individuals, especially if they belong to marginalized groups, to interrogate the systems alone or to seek redress when they are harmed. Apart from instigating collective challenges, broader public discussion is needed about the transparency, accountability and oversight of data systems required for protecting citizens' rights. Further, how should information about these new systems be communicated so that everyone can understand? What are governments' obligations to ensure data literacy? And are there no-go areas? Surely maps of where and how governments are introducing data systems and sharing people's data should, as a first step, be provided as a matter of democratic accountability.

Just as important is ensuring that citizens can meaningfully challenge the systems that affect them. Given that datafied systems will always be error-prone, human feedback becomes essential. Critiques should be welcomed rather than fended off. A fundamental rethink of governance is in order—in particular, on the question of how dissent and collaboration might be better fostered by public bodies and authorities in societies permeated by data. SA

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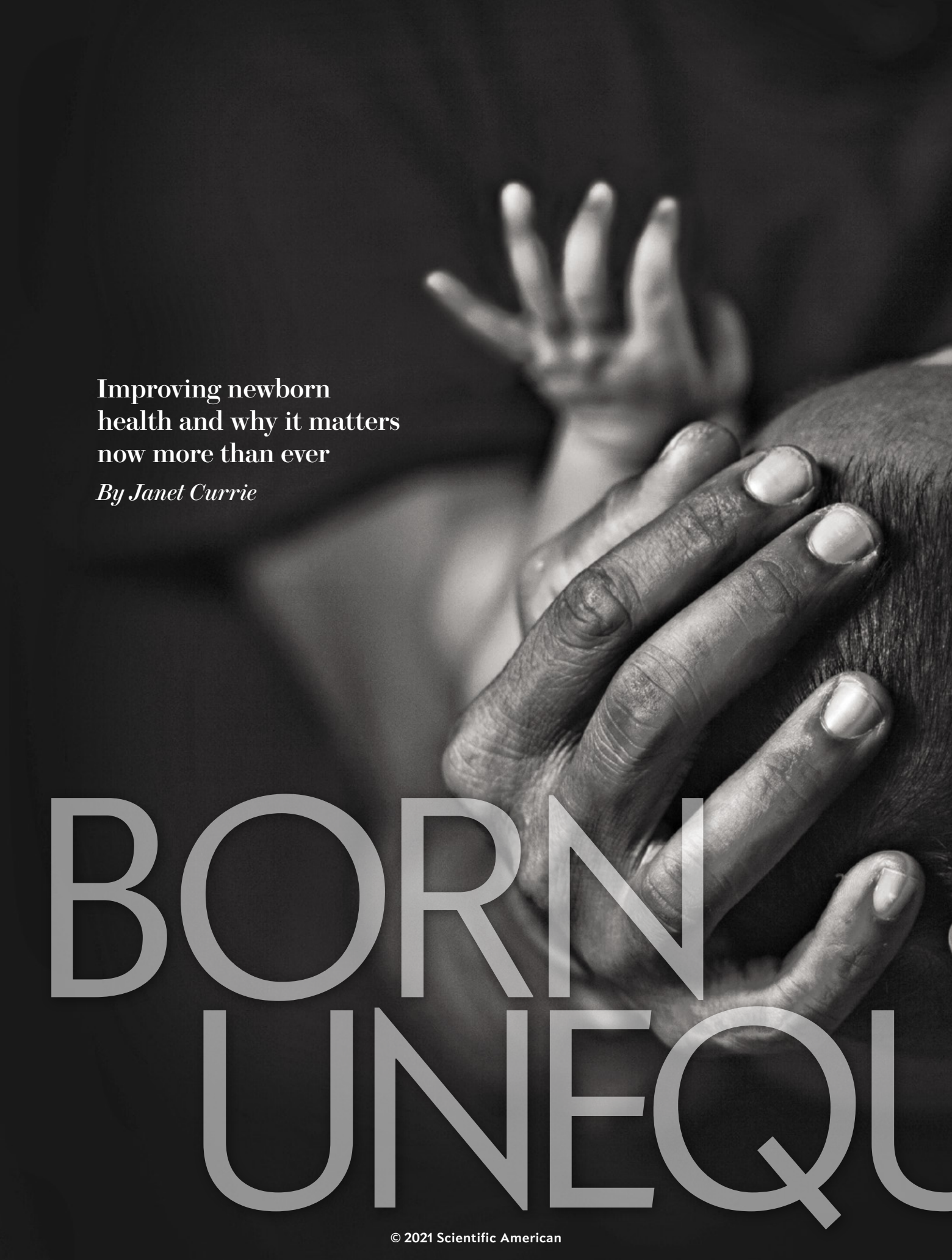

Improving newborn health and why it matters now more than ever

By Janet Currie

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THE COVID-19 PANDEMIC HAS DISPROPORTIONATELY HURT MEMBERS OF MINORITY COMMUNITIES in the U.S. As of July 2020, 73.7 Black people out of every 100,000 had died of the coronavirus—compared with 32.4 of every 100,000 white people. Structural racism accounts for much of this disparity. Black people are more likely to have jobs that require them to leave their homes and to commute by public transport, for example, both of which increase the chances of getting infected. They are also more likely to get grievously ill when the virus strikes. As of June 2020, the hospitalization rate for those who tested positive for SARS-CoV-2 infection was more than four times higher for Black people than for non-Hispanic white people.

One reason for this alarming ratio is that Black people have higher rates of diabetes, hypertension and asthma—ailments linked to worse outcomes after infection with the coronavirus. Decades of research show that these health conditions, usually diagnosed in adulthood, can reflect hardships experienced while in the womb. Children do not start on a level playing field at birth. Risk factors linked to maternal poverty—such as malnutrition, smoking, exposure to pollution, stress or lack of health care during pregnancy—can predispose babies to future disease. And mothers from minority communities were and are more likely to be subjected to these risks.

Today's older Black Americans—those most endangered by COVID-19—are more likely than not to have been born into poverty. In 1959, 55 percent of Black people in the U.S. had incomes below the poverty level, compared with fewer than 10 percent of white people. Nowadays 20 percent of Black Americans live below the poverty line, whereas the poverty rate for white Americans remains roughly the same. Despite the reduction in income inequality between these groups, ongoing racism works through circuitous routes to worsen the odds for minority infants. For example, partly because of a history of redlining (practices through which financial and other institutions made it difficult for Black families to buy homes in predominantly white areas), even better-off Black people are more likely to live in polluted areas than are poorer white people—with a corresponding impact on fetal health. Worryingly, people disadvantaged in utero are more likely to have lower earnings and educational attainments, so that the effects of poverty and discrimination can span generations.

Researchers now have hard evidence that targeted programs can improve health and reduce inequality. Expansions of public health insurance offered to women, infants and children under Medicaid and the Children's Health Insurance Program have already had a tremendous effect, improving the health and well-being of a generation—with the largest impacts on Black children. And interventions after birth can often reverse much of the damage suffered prenatally. Along with other researchers, I have shown that nutrition programs for pregnant women, infants and children; home visits by nurses during pregnancy and after childbirth; high-quality child care; and income support can improve the outcomes for disadvantaged children. Such interventions came too late to help those born in the 1950s or earlier, but they have narrowed the health gaps between poor and rich children, as well as between white and Black children, in the subsequent decades.

Enormous disparities in health and vulnerability remain, however, and raise disturbing questions about how children born to poorer mothers during the current pandemic, with all its social and economic dislocations, will fare. Alarmingly, just before the pandemic hit, many of the most essential programs were being cut back. Since the beginning of 2018, more than a million children have lost Medicaid coverage because of new work requirements and other regulations, and many have become uninsured. Now that the COVID death toll has exposed stark inequalities in health status and their attendant risks, Americans must act urgently to reverse these setbacks and to strengthen public health systems and the social safety net, with special attention to the care of mothers, infants and children.

THE HUNGER WINTER

DECADES OF CAREFUL OBSERVATION and analysis have gone into uncovering the manifold ways in which the fetal environment affects the future health and

Mohd Fauzie *Getty Images (preceding pages)*

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prospects of a child, and much remains mysterious. It would be unethical to run experiments to measure the toll on a fetus of, say, malnutrition or pollution. But we can look for so-called natural experiments—the (sometimes horrific) events that cause variations in these factors in ways that mimic an actual experiment. The late epidemiologist David Barker argued in the 1980s that poor nutrition during pregnancy could "program" babies in the womb to develop future ailments such as obesity, heart disease and diabetes. Initial evidence for such ideas came from studies of the Dutch "Hunger Winter." In October 1944 Nazi occupiers cut off food supplies to the Netherlands, and by April 1945 mass starvation had set in. Decades later military, medical and employment records showed that adult men whose mothers were exposed to the famine while pregnant with them were twice as likely to be obese as other men and were more likely to have schizophrenia, diabetes or heart disease.

Anyone born in the Netherlands during the famine is part of a cohort that can be followed over time through a variety of records. Nowadays many researchers, including me, look for natural experiments to delineate such cohorts and thereby tease out the long-term impacts of various harms experienced in utero. We also rely heavily on the most widely available measure of newborn health: birth weight. A baby may have "low" birth weight, defined as less than 2,500 grams (about 5.5 pounds), or "very low" birth weight of less than 1,500 grams (3.3 pounds). The lower the birth weight, the higher the risk of infant death. We have made enormous progress in saving premature babies, but low-birth-weight children are still at much higher risk for complications such as brain bleeds and respiratory problems that can lead to long-term disability.

In recent years computer analysis of large-scale electronic records has made it possible to connect infant health, as measured by birth weight, to long-term outcomes not just for cohorts but also for individuals. Studies of twins or siblings, who have similar genetic and social inheritance, show that those with lower birth weight are more likely to have asthma or attention deficit hyperactivity disorder (ADHD) when they get older. Several studies also show that lower-birth-weight twins or siblings have worse scores on standardized tests. As adults, they are more likely to have lower wages, to reside in lower-income areas or to be on disability-assistance programs. In combination, cohort and sibling studies demonstrate that low birth weight is predictive of several adverse health outcomes later in life, including increased probabilities of asthma, heart disease, diabetes, obesity and some mental health conditions.

Birth weight does not capture all aspects of a child's health: a fetus gains most of its weight in the third trimester, for example, but many studies find that shocks in the first trimester are particularly harmful. I nonetheless use the measure in my studies because it is important and commonly available, having been recorded for tens of millions of babies for decades.

Significantly, low birth weight is much more common among infants born to poor and minority mothers. In 2016 13.5 percent of Black mothers had low-birth-weight babies, compared with 7.0 percent of non-Hispanic whites and 7.3 percent of Hispanic mothers. Among those with college educations, 9.6 percent of Black mothers had low-birth-weight babies, compared with 3.7 percent of non-Hispanic white mothers. These inequalities in health at birth reflect large differences in exposure to several factors that affect fetal health.

POOR NUTRITION DURING PREGNANCY CAN "PROGRAM" BABIES IN THE WOMB TO DEVELOP FUTURE AILMENTS.

THE POVERTY CONNECTION

AS ALREADY NOTED, the quality of a mother's nutrition substantially influences the health of her babies. In 1962 geneticist James V. Neel hypothesized that a so-called thrifty gene had programmed humankind's hunter-gatherer ancestors to hold on to every calorie they could get and that in modern times, that tendency, combined with an abundance of high-calorie foods, led to obesity and diabetes. Recent studies on laboratory animals indicate, however, that the link between starvation and disease is not genetic in origin but epigenetic, altering how certain genes are "expressed" as proteins. Prolonged calorie deprivation in a pregnant mouse, for example, prompts changes in gene expression in her offspring that predispose them to diabetes. What is more, the effect may be transmitted through generations.

Outright starvation is now rare in developed countries, but poorer mothers in the U.S. often lack a diet rich in fruits and vegetables, which contain essential micronutrients. Deficiencies in folate intake during pregnancy are linked to neural tube defects in children, for example.

At present, one of the leading causes of low birth weight in the U.S. is smoking during pregnancy. In the 1950s pregnant women were told that smoking was safe for their babies. Roughly half of all new mothers in 1960 reported smoking while pregnant. Today, thanks to public education campaigns, indoor-smoking bans and higher cigarette taxes, only 7.2 percent of pregnant women say that they smoke. And 55 percent of women who smoked in the three months before they got pregnant quit for at least the duration of their pregnancy.

Possibly because going to college places women in a milieu where smoking is strongly discouraged, mothers with higher education levels are less likely to smoke. Among mothers with less than a high school education, 11.7 percent smoke, compared with 1 percent of mothers with a bachelor's degree.

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Among the many harmful chemicals in cigarette smoke is carbon monoxide (CO), which restricts the amount of oxygen carried by the blood to the fetus. In addition, nicotine affects the development of blood vessels in the uterus and disrupts developing neurotransmitter systems, leading to poorer psychological outcomes. Maternal cigarette smoking during pregnancy has also been associated with epigenetic changes in the fetus, although how these alterations affect an individual in later years remains mysterious. The recent surge in vaping, which delivers high doses of nicotine and which surveys show has been tried by almost 40 percent of high school seniors, is an extremely worrying development that could have long-term implications for fetal and infant health.

Yet another significant source of harm for fetuses is pollution. Pregnant women may be exposed to thousands of toxic chemicals in the air, water, soil and sundry products at home and at work. Complicating matters, each pollutant acts in a different way. Particulates in the atmosphere are thought to cause inflammation throughout the body, which has been linked to preterm labor and, consequently, to low birth weight. Lead, ingested through water or air, crosses the placenta to accumulate in the fetus and harm brain development. In 2005 Jessica Wolpaw Reyes of Amherst College showed that the phaseout of leaded gasoline in the U.S. led to a decrease of up to 4 percent in infant mortality and low birth weight.

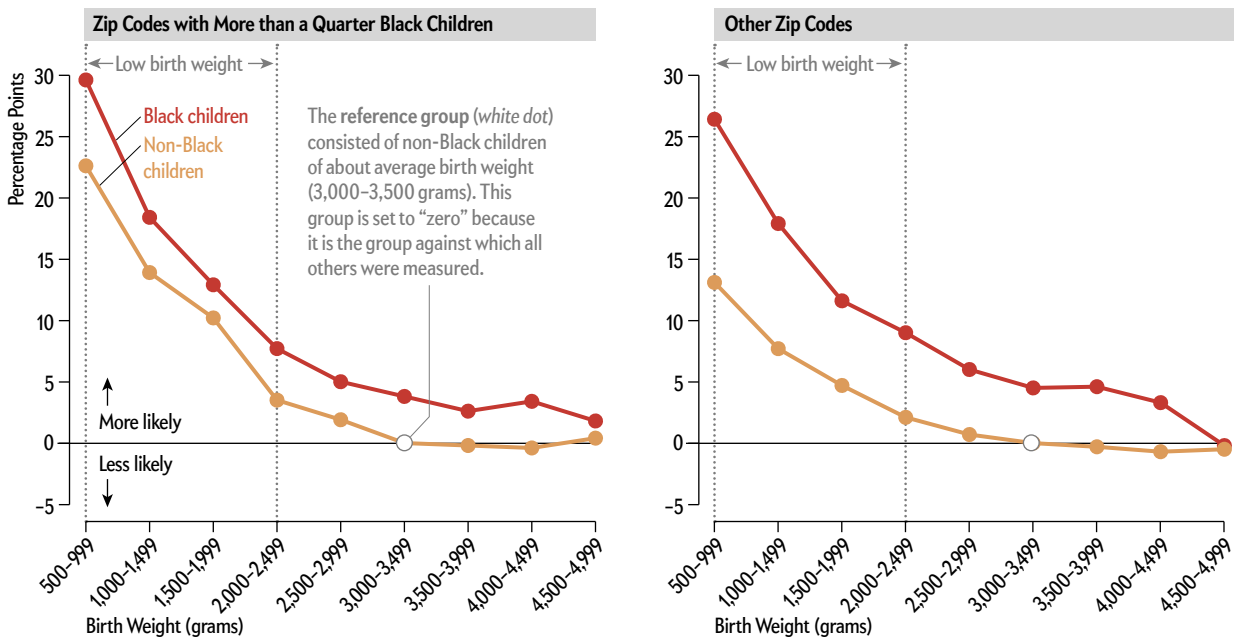
A fetus may also receive less oxygen if its mother inhales CO from vehicle exhaust. In a 2009 study of mothers who lived near pollution monitors, my coworkers and I found that high levels of ambient CO were correlated with reduced birth weight. Worryingly, the effects of CO from air pollution are five times greater for smokers than for nonsmokers.

Reducing pollution can have immediate benefits for pregnant women and newborns. In a 2011 study of babies born in New Jersey and Pennsylvania, Reed Walker of the University of California, Berkeley, and I focused on mothers who lived near E-ZPass electronic toll plazas before and after they began operating. We compared them with mothers who lived a little farther from the toll plazas but along the same busy roads. Both groups of mothers were exposed to traffic, but before E-ZPass, the mothers near the toll plazas were exposed

Asthma, Pollution and Residential Segregation

Asthma rates were twice as high for Black people as for other people in the U.S. in 2010. Part of this disparity comes from low birth weight, which is linked to asthma and is more common in Black infants. These graphs illustrate the impact of pollution and residential segregation on asthma rates. They compare New Jersey children in neighborhoods where more than a quarter of children are Black versus children in all other neighborhoods. Comparing the left and right panels shows that low birth weight has a larger effect on asthma rates among children of *all* races in the neighborhoods where most Black children live. Hence, residential segregation, which results in Black children being more likely to live in more polluted places, compounds the negative effects of low birth weight.

Likelihood of Developing Asthma Compared with Non-Black Children of Average Birth Weight



Source: "Is It Who You Are or Where You Live? Residential Segregation and Racial Gaps in Childhood Asthma," by Diane Alexander and Janet Currie, in *Journal of Health Economics*, Vol. 55; July 25, 2017

Graphic by Amanda Montañez

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to more pollution because cars idled while waiting to pay the tolls. E-ZPass greatly reduced pollution right around the toll plazas by allowing cars to drive straight through. Startlingly, the introduction of E-ZPass reduced the incidence of low birth weight by more than 10 percent in the neighborhoods nearest the toll plazas.

In another study, my collaborators and I examined birth records for 11 million newborns in five states. We found that a shocking 45 percent of mothers lived within about a mile of a site that emitted toxic chemicals such as heavy metals or organic carcinogens—a number that rose to 61 percent among Black mothers. Focusing on babies born to mothers who lived within a mile of a plant, we compared birth weights when the facility was operating with birth weights when it was closed. For additional context, we also compared babies born within a mile of a plant with babies born in a one-to-two-mile band around the plants. Both groups of mothers were likely to be similarly affected by the economics of factory openings and closings, but mothers who lived closer were more likely to have been exposed to pollution during pregnancy. We found that an operating plant increased the probability of low birth weight by 3 percent among babies whose mothers lived less than a mile from the plant.

The racial divide in pollution exposure is profound, in part because of continuing segregation in housing that makes it difficult for Black families to move out of historically Black neighborhoods. Disadvantaged communities may also lack the political power to fend off harmful development, such as a chemical plant, in their vicinity. In the E-ZPass study, roughly half of the mothers who lived next to toll plazas were Hispanic or Black, compared with only about a tenth of mothers who lived more than six miles away from a toll plaza. And in a paper published in 2020, John Voorheis of the U.S. Census Bureau, Walker and I showed that across the entire U.S., neighborhoods with higher numbers of Black residents have systematically worse air quality than other neighborhoods. Black people are also twice as likely as others to live near a Superfund hazardous waste site. For these reasons, pollution-control measures such as the Clean Air Act have greatly benefited Black people.

FIGHT OR FLIGHT

STRESS DISPROPORTIONATELY impacts the poor—who have chronic worries about paying bills, for example—and also harms fetuses. A stressful situation triggers the release of hormones that orchestrate a range of physical changes associated with the fight-or-flight response. Some of these hormones, including cortisol, have been linked to preterm labor, which in turn leads to low birth weight. High circulating levels of cortisol in the mother during pregnancy may damage the fetus's cortisol-regulation system, making it more vulnerable to stress. And stress can trigger behavioral responses in a mother such as increased smoking or drinking, which are also harmful to the fetus.

One revealing study indicates that fetal exposure to maternal stress can have greater negative long-term effects on mental health than stress directly experienced by a child. Petra Persson and Maya Rossin-Slater, both at Stanford University, looked at the impact of the death of a close relative. Death can bring many unwelcome changes to a family, such as reduced income, which may also influence child development. To account for such complications, the researchers used administrative data from Sweden to compare children whose mothers were affected by a death during the prenatal period with those whose mothers were affected by a death during the child's early years. They found that children affected by a death prenatally were 23 percent more likely to use medication for ADHD at ages nine to 11 and 9 percent more likely to use antidepressants in adulthood than were children whose families experienced a death a few years after their birth.

REDUCING POLLUTION CAN HAVE IMMEDIATE BENEFITS FOR PREGNANT WOMEN AND NEWBORNS.

Another pathbreaking study measured levels of cortisol, an indicator of stress, during pregnancy. By age seven, children whose mothers had higher cortisol levels during pregnancy had received up to one year less schooling than their own siblings, indicating that they had been delayed in starting school. Moreover, for any given level of cortisol in the mother's blood, the negative effects were more pronounced for children born to less educated mothers. This finding suggests that although being stressed during pregnancy is damaging to the fetus, mothers with more education are better able to buffer the effects on their children—an important finding in view of the severe stress imposed by COVID on families today.

It is no surprise that disease can also harm a fetus. Douglas V. Almond of Columbia University looked at people born in the U.S. at the peak of the influenza epidemic of 1918 and found that they were 1.5 times more likely to be poor as adults than were those born just before them. In work I conducted with Almond and Mariesa Herrmann of Mathematica looking at mothers born between 1960 and 1990 in the U.S., we found that women who were born in areas where an infectious disease was raging were more likely to have diabetes when they gave birth to their own children decades later—and the effects were twice as large for Black people. More recently, Hannes Schwandt of Northwestern University examined Danish data and found that maternal infection with ordinary seasonal influenza in the third trimester doubles the rate of premature birth and low birth weight, and infection in the second trimester leads to a 9 percent reduction in earnings and a 35 percent increase in welfare dependence once the child reaches adulthood.

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PREVENTING HARM

HEALTH AT BIRTH and beyond can nonetheless be improved through thoughtful interventions targeting pregnant women, babies and children and through reductions in pollution. The food safety net in the U.S. has already had tremendous success in preventing low birth weight in the babies of disadvantaged women. The rollout of the food stamp program (now called the Supplemental Nutrition Assistance Program, or SNAP) across the U.S. in the mid-1970s reduced the incidence of low birth weight by between 5 and 11 percent. In addition, children who benefited from the rollout grew up to be less likely to have metabolic syndrome—a cluster of conditions that include obesity and diabetes. Notably, women who had benefited as fetuses or young children were more likely to be economically self-sufficient.

THE U.S. FOOD SAFETY NET HAS ALREADY HAD IMMENSE SUCCESS IN IMPROVING CHILDREN'S FUTURE PROSPECTS.

The 1970s also saw the introduction of the Special Supplemental Nutrition Program for Women, Infants and Children, popularly known as WIC. Approximately half of eligible pregnant women in the U.S. receive nutritious food from WIC, along with nutrition counseling and improved access to medical care. Dozens of studies have shown that when women participate in WIC during pregnancy, their babies are less likely to have low birth weight. In work looking at mothers in South Carolina, Anna Chorniy of Northwestern University, Lyudmyla Ardan (Sonchak) of Susquehanna University and I were able to show that children whose mothers received WIC during pregnancy were also less likely to have ADHD and other mental health conditions that are commonly diagnosed in early childhood.

In the late 1980s and early 1990s, state and federal governments worked together to greatly expand public health insurance for pregnant women under the Medicaid program. In work with Jonathan Gruber of the Massachusetts Institute of Technology, I showed that public health insurance lowered infant mortality and improved birth weight. Today the children whose mothers became eligible for health insurance coverage of their pregnancies in that period have higher levels of college attendance, employment and earnings than the children of mothers who did not. They also have lower rates of chronic conditions and are less likely to have been hospitalized. The estimated effects are strongest for Black people, who, having lower average incomes, benefited the most from the expansions. The fact that these babies are more likely to eventually get a college education also increases the life chances of *their* children. In the U.S., an additional year of college education for the mother reduces the incidence of low birth weight in her children by 10 percent.

Even so, too many children are still born with low birth weight, especially if their mothers are Black. Significantly, targeted interventions after birth can improve their outcomes. Programs such as the Nurse-Family Partnership provide home visits by nurses to low-income women who are pregnant for the first time, many of whom are young and unmarried. The nurse visits every month during the pregnancy and for the first two years of the child's life to provide guidance about healthy behavior. The assistance reduces child abuse and adolescent crime and enhances children's academic achievement.

Providing cash payments to poor families with young children also improves both maternal health and child outcomes, suggesting that COVID relief payments will have important protective effects. In the U.S., the largest preexisting program of this type is the Earned Income Tax Credit (EITC). Studies of beneficiaries of the EITC show that children in families that received increased amounts had higher test scores in school. With financial stress being somewhat relieved, the mental health of mothers in these families also improved. In addition, quality early-childhood education programs augment future health, education and earnings and reduce crime. Head Start, the federally funded preschool program that was rolled out beginning in the 1960s, has also had substantial positive effects on health and education outcomes, especially in places with less access to alternative child care centers.

A 2018 study, especially noteworthy in light of the tragic lead poisoning in Flint, Mich., shows that even some of the negative effects of lead can be reversed. In Charlotte, N.C., lead-poisoned children who received lead remediation, nutritional and medical assessments, WIC and special training for their caregivers saw reductions in problem behaviors and advanced school performance.

LOOKING AHEAD

INVESTMENTS IN PREGNANT WOMEN and infants have been paying off, their success reflected in dramatically falling infant mortality rates in the U.S.—despite rising inequality in income and wealth. Alarmingly, however, many successful programs, such as the Clean Air Act, SNAP and Medicaid, are under attack. The Coronavirus Aid, Relief and Economic Security (CARES) Act passed in March 2020 provided some relief, at least with respect to Medicaid. CARES temporarily suspended disenrollment from the program, giving additional flexibility to state Medicaid programs in terms of time lines and eligibility procedures. Still, states may be hard-pressed to enroll the many who will become newly eligible for Medicaid because of job loss. Moreover, states that have not expanded the Medicaid program to cover otherwise ineligible low-income adults, as allowed by the Affordable Care Act, may see many more uninsured.

A National Academies of Sciences, Engineering and Medicine report published in 2019 laid out a road map for reducing child poverty by half within 10 years. One

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SKYLINE of Flint, Mich., in 2016, after declaration of a federal emergency because of lead contamination in the water supply.

of the most stunning findings of the report is that it is feasible to meet that target by expanding programs that already exist. Following these directions would have a profound impact on health and health disparities. Targeted approaches, such as more thorough investigation of maternal deaths occurring up to one year after a birth, are also necessary. Even simple preventive measures such as giving pregnant women flu shots can have a tremendously positive effect on infant health and child development. Diagnosis and treatment of conditions such as preeclampsia (high blood pressure associated with pregnancy) are key to both protecting babies and lowering maternal mortality rates. It is important to help pregnant women quit smoking and to develop new approaches relevant to a new generation addicted to vaping. Also needed are stronger protections for women at risk of domestic violence, which leads directly to chronic stress, premature deliveries and low birth weight.

One salient open question is what effect the pandemic will have on the generation of children affected by it in utero and in early life. COVID itself may have negative effects on the developing fetus. The latest data suggest that although the overall risk is low, pregnant women are at increased risk of becoming critically ill (as they are with influenza or SARS). Affected babies, however, do not seem to be at risk of obvious birth defects (as they are with the Zika virus). Still, given the fact that COVID affects many body systems, it may prove to have subtler negative effects on the developing fetus. The pandemic is also an extremely stressful event compounded by the sharpest economic downturn since the Great Depression. There are reports of increases in domestic violence, alcohol consumption and drug overdoses, all of which are known to be harmful to the developing fetus. In consequence, the generation now in utero is likely to be at increased risk going forward and will require intensive social investments to overcome its poorer start in life.

In a recent sermon on the late civil rights leader John Robert Lewis, Reverend James Lawson recounted the significant gains for Americans of all colors that had resulted from that movement. He went on to ask that America's political leaders "work unfalteringly on behalf of every boy and every girl, so that every baby born on these shores will have access to the tree of life ... let all the people of the U.S.A. determine that we will not be quiet as long as any child dies in the first year of life in the United States. We will not be quiet as long as the largest poverty group in our nation are women and children." As we rebuild our shattered safety nets and public health systems in the aftermath of COVID-19, we need to seize the moment and use the knowledge we have gained about how to protect mothers and babies—to give every child the opportunity to flourish. SA

Janet Currie is Henry Putnam Professor of Economics and Public Affairs and co-director of the Center for Health and Wellbeing at Princeton University. She studies socioeconomic differences in health and access to health care, as well as environmental threats to health.

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Racism, Not Race, Is the Danger

Public health specialist and physician Camara Phyllis Jones talks about ways that jobs, communities and health care leave Black people in the U.S. more exposed and less protected from COVID

By Claudia Wallis

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CAMARA PHYLLIS JONES

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COVID-19 HAS CUT A JARRING AND UNEQUAL PATH ACROSS THE U.S. The disease has disproportionately harmed and killed people of color. Compared with non-Hispanic white people, American Indian, Black and Latinx individuals, respectively, faced 3.5, 2.8 and 3.0 times the risk of being hospitalized for the infection and 2.4, 1.9 and 2.3 times the chance of dying, according to the Centers for Disease Control and Prevention.

The reason for these disparities is not biological but is the result of the deep-rooted and pervasive impacts of racism, says epidemiologist and family physician Camara Phyllis Jones. Racism, she explains, has led people of color to be more exposed and less protected from the virus and has burdened them with chronic diseases. For 14 years Jones worked at the CDC as a medical officer and director of research on health inequities. As president of the American Public Health Association in 2016, she led a campaign to explicitly name racism as a direct threat to public health. She is currently a Presidential Visiting Fellow at the Yale School of Medicine and is writing a book proposing strategies for a national campaign against racism.

As the country began to confront the unequal impact of COVID and the ongoing legacy of racial injustice it represents, Jones spoke with *Scientific American* contributing editor Claudia Wallis about the ways that discrimination has shaped the suffering produced by the pandemic.

Along with age, male gender and certain chronic conditions, race has turned out to be a risk factor for a severe outcome from COVID. Why is that?

Race doesn't put you at higher risk. Racism puts you at higher risk. It does so through two mechanisms: People of color are more infected because we are more exposed and less protected. Then, once infected, we are more likely to die because we carry a greater burden of chronic diseases from living in disinvested communities with poor food options [and] poisoned air and because we have less access to health care.

Why do you say Black, brown and Indigenous people are more exposed?

We are more exposed because of the kinds of jobs that we have: the frontline jobs of home health aides, postal workers, warehouse workers, meat packers, hospital orderlies. And those frontline jobs—which, for a long time, have been invisibilized and undervalued in terms of the pay—are now categorized as essential work. The overrepresentation [of people of color] in these jobs doesn't just so happen. (Nothing differential by race just so happens.) It is tied to residential and educational segregation in this country. If you have a poor neighborhood, then you'll have poorly funded schools, which often results in poor education outcomes and another generation lost. When you have poor educational outcomes, you have limited employment opportunities.

We are also more exposed because we are overrepresented in prisons and jails—jails where people are often financial detainees because they can't make bail. And brown people are more exposed in immigration detention centers. We are also more likely to be unhoused—with no access to water to wash our hands—or to live in smaller, more cramped quarters in more densely populated neighborhoods. You're in a one–bedroom apartment with five people living there, and one is your grandmother, and you can't safely isolate from family members who are frontline workers.

Why have people of color been less protected?

We have been less protected because in these frontline jobs—but also in the nursing homes and in the jails, prisons and homeless shelters—the personal protective equipment [PPE] was very, very slow in coming. Look at the meatpacking plants, for example. We are less protected because our roles and our

Kevin Grady *Radcliffe Institute*

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lives are less valued—less valued in our job roles, less valued in our intellect and our humanity.

You've noted that once infected, people of color are more likely to have a poor outcome or die. Could you break down the reasons?

This has two buckets: First, we are more burdened with chronic diseases. Black people have 60 percent more diabetes and 40 percent more hypertension. That's not because we are not interested in health but because of the context of our lives. We are living in unhealthier places without the food choices we need: no grocery stores, so-called food deserts and what some people describe as "fast-food swamps." More polluted air, no place to exercise safely, toxic dump sites—all of these things go into communities that have been disempowered. That's why we have more diseases, not because we don't want to be healthy. We very much want to be healthy. It's because of the burdens that racism has put on our bodies.

What is the second bucket that raises risks from COVID?

Health care. Even from the beginning, it was hard for Black folks to get tested because of where testing sites were initially located. They were in more affluent neighborhoods—or there was drive-through testing. What if you don't have a car? And there was the need to have a physician's order to get a test. We heard about people who were symptomatic and presented at emergency departments but were sent back home without getting a test. A lot of people died at home without ever having a confirmed diagnosis. So even though we know we are overrepresented, we may have been undercounted.

Once you get into the hospital, there's a whole spectrum of scarce resources, so different states and hospital systems had what they called "crisis standards of care." In Massachusetts, they were very careful to say you cannot use race or language or zip code to discriminate [on who gets a ventilator]. But you could use expected [long-term] survival. Then the question was: Do you have these preexisting conditions? This was going to systematically put Black and brown people at a lower priority or even disqualify them from access to these lifesaving therapies. [*Editor's Note: Massachusetts later changed its guidelines, but Jones viewed the revision as an incomplete fix.*]

Making sure that vaccine campaigns reach communities of color is surely part of the solution, but what else can be done to better protect vulnerable minorities?

We need more PPE for all frontline workers; we need to value all those lives. We need to offer hazard pay and something like conscientious objector status for frontline workers who feel it is too dangerous to go back into the poultry or meatpacking plant. We know there are communities at higher risk, and we need to be doing more testing there. We need to broaden our gaze from a narrow focus on the individual ("vaccine hesitancy") to acknowledge that structural barriers continue to impact access to the vaccines.

Several states do not report racial and ethnic data on COVID cases. Why is that a problem?

States should be reporting their data disaggregated by race, especially now we know Black and brown and Indigenous folks are at higher risk of being infected and then dying. It's not just to document it, not just to alarm or to arm some people with a false sense of security. It's because we need to provide resources according to need: health-care resources, testing resources and prevention types of resources.

Are you concerned about how the CDC's relaxation of its face mask guidance will impact essential workers and communities of color?

Yes. We need to recognize that we are all in this together, that masks provide reciprocal protection with no downsides, and that asymptomatic spread continues to fuel this pandemic, so that a continued mask mandate for all without regard to immunization status should be maintained until there are no COVID infections, hospitalizations or deaths. It is such a simple, effective, and community-minded intervention that hurts no one and helps everyone.

Over the past year we have seen people take to streets to protest another kind of deadly racial inequity: police violence against people of color, especially against Black men and boys. As awareness spreads about the pervasive nature of racism in systems ranging from law enforcement to health care to housing, do you see an opportunity for meaning ful change?

The outrage is encouraging because it has been expressed by folks from all parts of our population. The Black Lives Matter protests were potentially mixing bowls for the virus, but at least they are not frivolous mixing bowls like pool parties. Participants in such protests were thinking not just about their individual health and well-being but about the collective power they have now to possibly make things better for their children and grandchildren. This is both a treacherous time and a time of great promise.

Racism is a system of structuring opportunity and assigning value based on the social interpretation of how one looks (which is what we call "race") that unfairly disadvantages some individuals and communities, unfairly advantages other individuals and communities, and saps the strength of the whole society through the waste of human resources. Perhaps this nation is awakening to the realization that racism does indeed hurt us all. SA

Claudia Wallis is an award-winning science journalist whose work has appeared in the *New York Times, Time, Fortune* and the *New Republic*. She was science editor at *Time* and managing editor of *Scientific American Mind*.

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We Learned the Wrong Lessons from the Tuskegee "Experiment"

It's understandable that Black people in the U.S. are wary of vaccines, but that despicable episode involved the withholding of treatment, whereas vaccines actively prevent disease

By Melba Newsome

RARELY A DAY GOES BY WITHOUT NATIONAL NEWS STORIES ABOUT VACCINE HESITANCY: how many people say they definitely will or won't get a shot and how many are in the "maybe" box. No account is complete without a particular focus on Black people who—despite contracting, being made severely ill by and dying from coronavirus at elevated rates—express a high degree of reluctance to being injected with something developed to save their lives.

When asked to explain why so many Black people simply don't trust the federal government with their health, a common answer is "because of what happened at Tuskegee." Reference to that seminal event has become shorthand for past medical betrayal, abuse and exploitation at the highest levels.

Beginning in 1932, the U.S. Public Health Service dangled the promise of free medical care to recruit rural Black men in Alabama's Macon County to participate in the "Tuskegee Study of Untreated Syphilis in the Negro Male." Even after penicillin became widely available as an effective treatment 15 years later, the researchers withheld the drug and watched as the men died or were ravaged by the effects of untreated syphilis.

Based on my reporting and personal conversations with friends and family, it's clear many people don't know what happened at Tuskegee. They mistakenly believe the 600 Black men were injected with something bad (syphilis) that made them sick when, in reality, the 399 men who had the disease were denied something good (a dose of penicillin) that would have healed them.

Even many who have the details right learned the wrong lesson from that shameful episode in American medical history. Instead of rejecting vaccines and new therapeutics that are routinely used to successfully treat and cure a majority of the population, Tuskegee should have taught Black people to make a simple demand: give me whatever you're giving the white folk.

If that had happened 70 years ago, Tuskegee, Ala., might be better known for the historically Black university that bears its name than for a government injustice chronicled in books, movies, plays and congressional hearings.

My home state of North Carolina was one of the first to release coronavirus data by race. The numbers from Charlotte and Mecklenburg County showed the virus's disparate impact on people of color and were soon confirmed by the skyrocketing COVID-19 rates in other cities with high Black populations.

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COVID-19 disproportionately impacts people of color—making those communities in greater need of the vaccine.

I saw early on how our well-justified mistrust of public health initiatives, a penchant for baseless conspiracy theories and a misreading of medical history would allow the crisis to take an outsize toll on the Black community.

That's why months later I decided to participate in the vaccine trials. I wanted to ensure that Black people were adequately represented in the research and to show that the vaccine should be embraced, not shunned. My motives weren't completely altruistic: clinical trial volunteers were supposed to be at or near the front of the line when a vaccine became available. That couldn't happen soon enough for me.

While some people thanked me for doing my part for medical science, others were perplexed and even angry that I would become a human guinea pig for the very medical establishment that has used our bodies for experimentation without care or consent.

The data and recent studies show that, rather than being recruited as lab rats, people of color are too often cut out of cutting-edge research. Black people make up about 14 percent of the U.S. population but, on average, only 5 percent of clinical trial participants for disease treatment.

It's almost taken as a given that our distrust is responsible for the low participation rates. But a study published in the journal *Cancer* found that some study recruiters viewed racial and ethnic minorities as less promising participants and in some cases reported withholding trial opportunities from them based on these perceptions.

That seemed to play out in the first phase I Moderna trial of 45 people; 40 were white, and two were Black. Pfizer and Moderna said diversity was a priority for their phase III trials to help ensure the vaccines' safety and effectiveness across populations and possibly reduce vaccine hesitancy; however, underrepresentation of Black people and other groups remained a concern.

My own experience suggests that their recruitment efforts could be improved. Last summer I started applying to participate in the clinical vaccine trials whenever I saw a call for volunteers. It took four applications and more than three months before I was at last selected for the Johnson & Johnson trial in mid-November.

Racism and discrimination in the healthcare system show up in the form of neglect, indifference and dismissal. The COVID death toll was higher among Black and brown people because too many had their symptoms dismissed, were turned away from hospitals rather than admitted or were forced to work in dangerous conditions because they were deemed essential.

Much of the fear of the vaccine is prefaced on the assumption that Black people would be expected to go first to make sure it was safe for everybody else. The low numbers of people being vaccinated in the communities hardest hit by COVID-19 show that just the opposite has happened. SA

Melba Newsome is an independent journalist who has published hundreds of articles in outlets that include *Prevention, Time, Bloomberg Businessweek, Wired, Glamour, Playboy, Oprah, Reader's Digest, Parade* and the *New York Times*.

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How to Reduce Maternal Mortality

To prevent women from dying in childbirth, the first step is to stop blaming them

TEXT BY MONICA R. McLEMORE AND GRAPHICS BY VALENTINA D'EFILIPPO

The shameful secret is out: Although the number of women who die in childbirth globally has fallen in recent decades, the rates in the U.S. have gone up. Since 1987 maternal mortality has doubled in the U.S. Now approximately 800 maternal deaths occur every year. One of the most striking takeaways from examining the data is racial disparity: Black women are three to four times more likely to die from pregnancy-related conditions such as cardiac issues and hemorrhage and to bear the brunt of serious complications. That risk is equally shared by all Black women regardless of income, education or geographical location. In other words, the factors that typically protect people during pregnancy are not protective for Black women.

Fortunately, most of these deaths are considered preventable, and therefore much more can be done to stop them. First, everyone—from doctors to the media to the public—needs to stop blaming women for their own deaths. Instead we should focus on better understanding the underlying contributing factors. These include a lack of data; not educating patients about signs and symptoms—and not believing them when they speak up; errors made by health-care providers; and poor communication among different health-care teams. Finally, studies have shown that interventions such as wider access to midwifery, group prenatal care, and social and doula support are effective in improving maternal health outcomes.

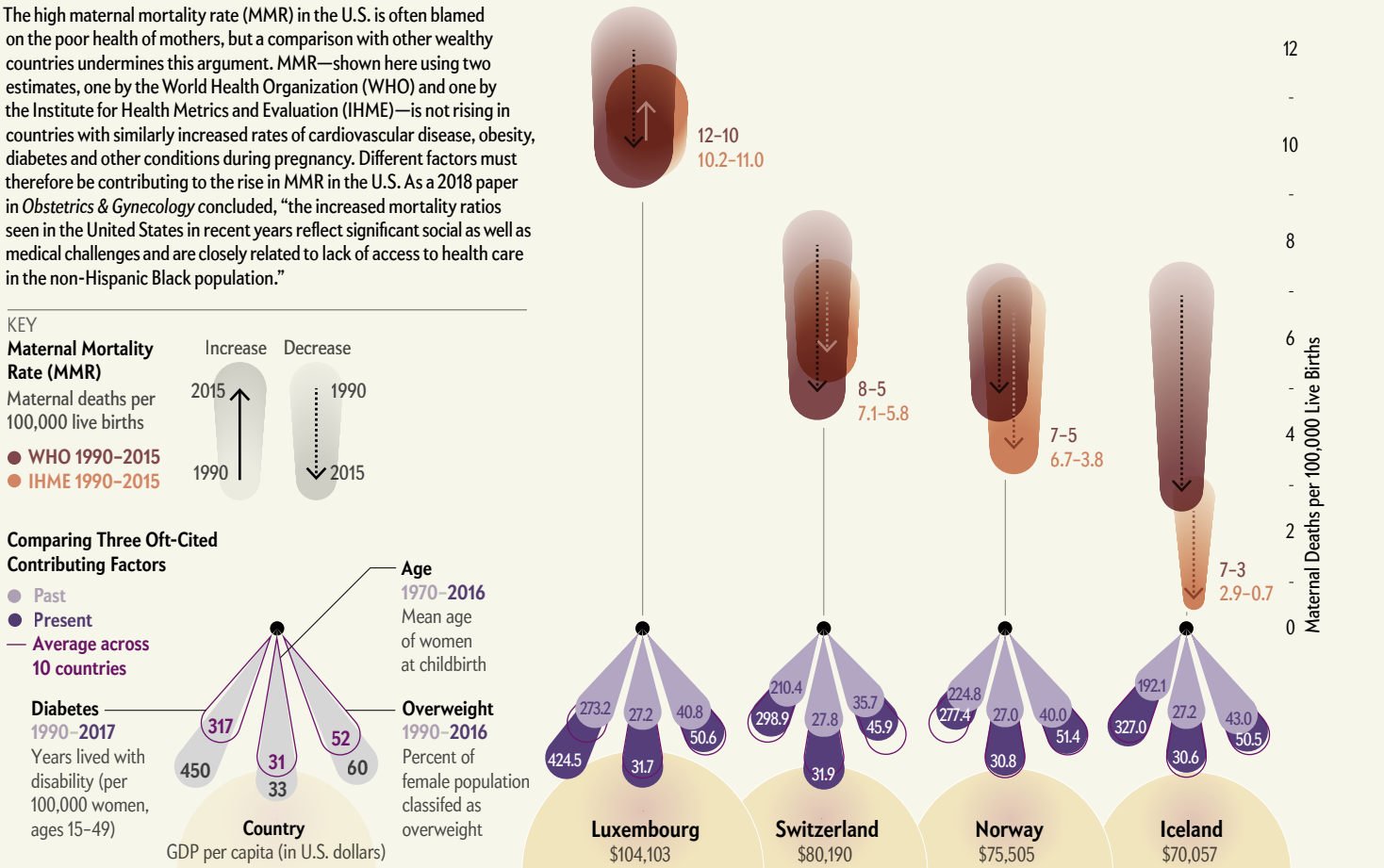
Progress has been slow and uneven. Deaths from hemorrhage, for example, have been reduced by half in some states because of standardized tool kits for care. And California has led in the pursuit of understanding root causes of maternal mortality. Still, structural racism is proving to be an intractable force.

Monica R. McLemore is an associate professor in the Family Health Care Nursing Department and a clinician-scientist at Advancing New Standards in Reproductive Health at the University of California, San Francisco.

Valentina D'Efilippo is an award-winning designer, creative director, and co-author of *The Infographic History of the World*. A voice in the field of data design, she leads a series of Masterclasses with the *Guardian*.

The U.S. Is an Outlier

The high maternal mortality rate (MMR) in the U.S. is often blamed on the poor health of mothers, but a comparison with other wealthy countries undermines this argument. MMR—shown here using two estimates, one by the World Health Organization (WHO) and one by the Institute for Health Metrics and Evaluation (IHME)—is not rising in countries with similarly increased rates of cardiovascular disease, obesity, diabetes and other conditions during pregnancy. Different factors must therefore be contributing to the rise in MMR in the U.S. As a 2018 paper in *Obstetrics & Gynecology* concluded, "the increased mortality ratios seen in the United States in recent years reflect significant social as well as medical challenges and are closely related to lack of access to health care in the non-Hispanic Black population."



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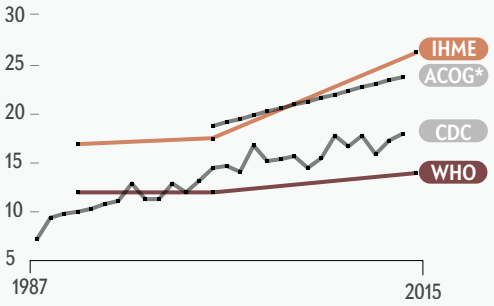
U.S. Maternal Mortality Rate Estimates

According to different organizations



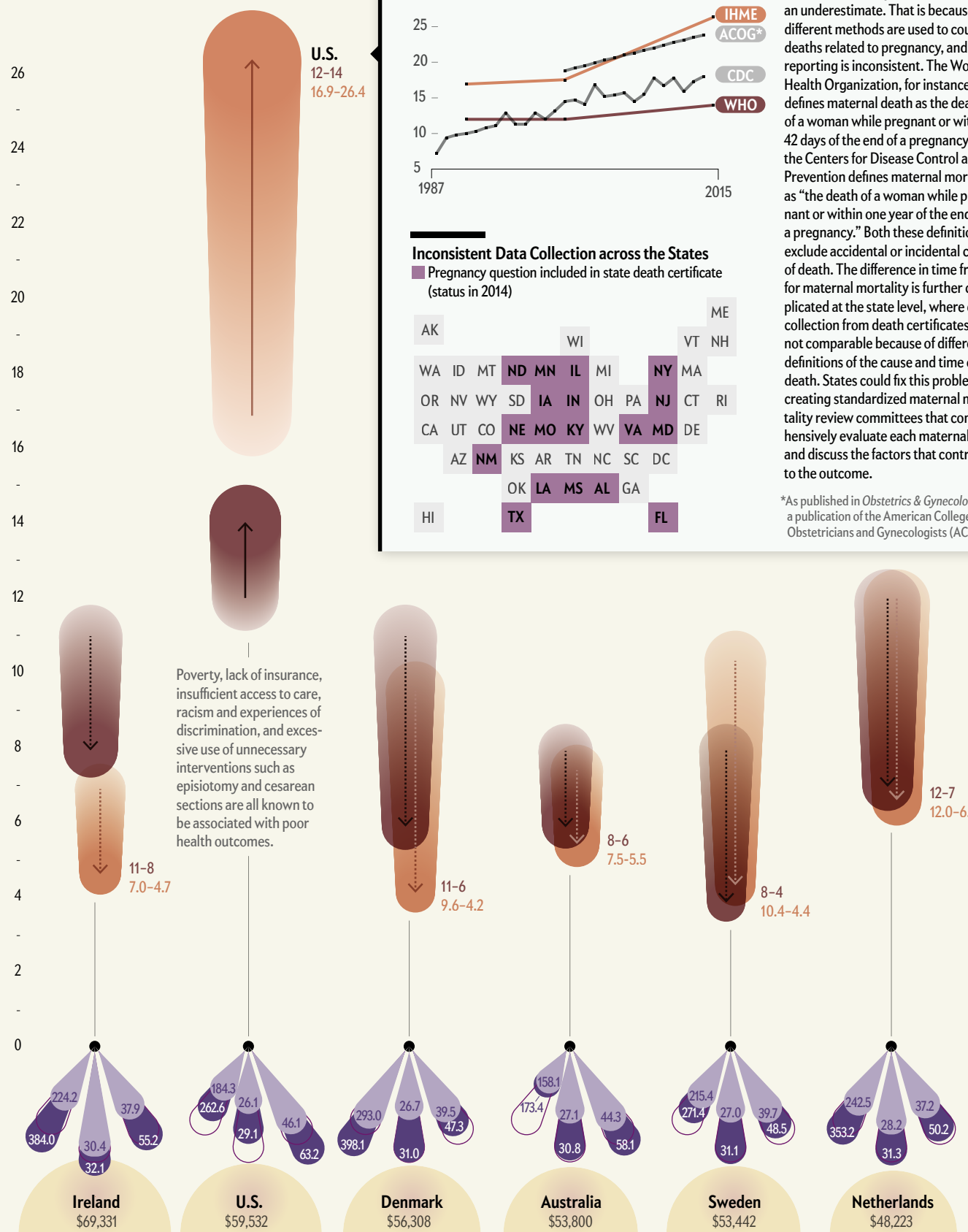
Inconsistent Data Collection across the States

Pregnancy question included in state death certificate (status in 2014)

Maternal Mortality Data in the U.S. Are an Unreliable Mess

As bad as the numbers sound, the U.S. MMR is widely considered to be an underestimate. That is because different methods are used to count deaths related to pregnancy, and reporting is inconsistent. The World Health Organization, for instance, defines maternal death as the death of a woman while pregnant or within 42 days of the end of a pregnancy. But the Centers for Disease Control and Prevention defines maternal mortality as "the death of a woman while pregnant or within one year of the end of a pregnancy." Both these definitions exclude accidental or incidental causes of death. The difference in time frame for maternal mortality is further complicated at the state level, where data collection from death certificates is not comparable because of different definitions of the cause and time of death. States could fix this problem by creating standardized maternal mortality review committees that comprehensively evaluate each maternal death and discuss the factors that contributed to the outcome.

*As published in *Obstetrics & Gynecology*, a publication of the American College of Obstetricians and Gynecologists (ACOG).



Sources: Global Health Observatory data repository, World Health Organization (*WHO MMR data*); Maternal Mortality 1990–2015 tables in *Global Burden of Disease Study 2015*. Global Burden of Disease Collaborative Network. Institute for Health Metrics and Evaluation, 2016 (*IHME MMR data*); IHME (*diabetes*); Organisation for Economic Co-operation and Development (*age*); WHO (*weight*); World Bank (*GDP*); "Recent Increases in the U.S. Maternal Mortality Rate: Disentangling Trends from Measurement Issues," by Marian MacDorman et al., in *Obstetrics & Gynecoiogy*, Vol. 128, No. 3; September 2016 (*ACOG data* and *map*)

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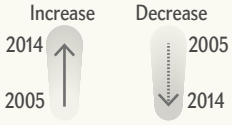
Who Is Dying?

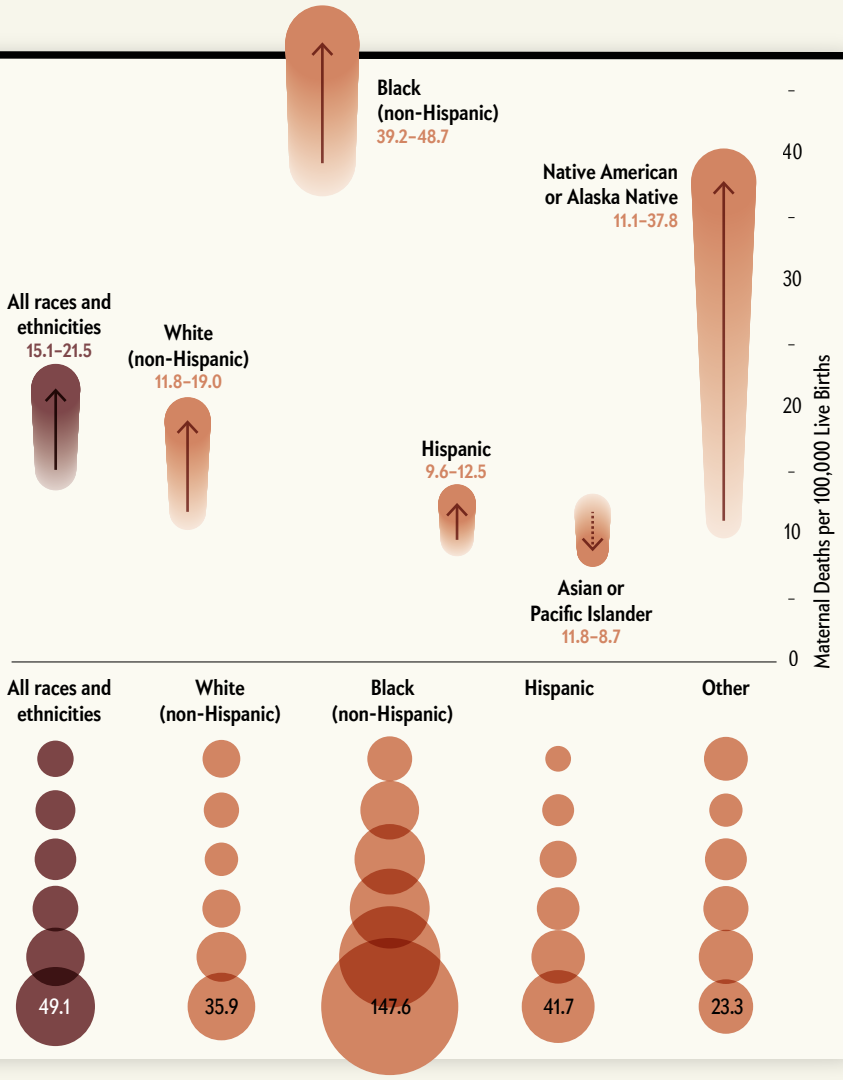
It's common to blame women for their own deaths. Many scientific publications have cited that women are coming to pregnancy older (called advanced maternal age, or geriatric pregnancy), sicker (with hypertension, diabetes or other chronic illnesses) and fatter (that is, suffering from obesity). But even in studies that control for age, chronic disease and obesity, the MMR in the U.S. still far exceeds rates in similarly wealthy nations. In a 2016 report that looked at pregnancy-related death disparities among states, the authors wrote that "excellent care is apparently available but is not reaching all the people."

U.S. Maternal Mortality Rate over Time, by Race and Ethnicity

2005–2014

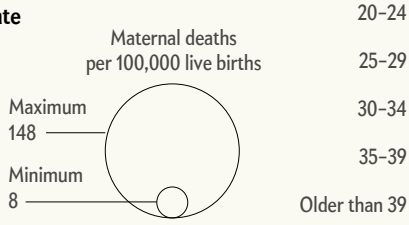


In all racial categories, maternal mortality is worse among older women, but the burden is concentrated among Black women, who are more likely to experience structural determinants of health that worsen over time.



U.S. Maternal Mortality Rate across Age Groups

2006–2010

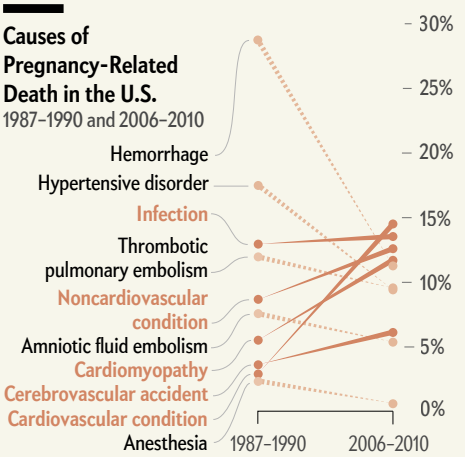


Why Are Mothers Dying—and How Many Causes Are Preventable?

Pregnancy exacerbates existing clinical conditions such as cardiovascular disease (including high blood pressure), enlarged heart and an irregular heartbeat. Black women are more likely to have these conditions before, during and after pregnancy. Chronic toxic stress—the way that experiences of discrimination are embodied—has been shown to make these conditions worse. But in the U.K., for example, there were only two deaths from preeclampsia and eclampsia over a three-year period, according to a 2018 study, suggesting deaths from these hypertensive disorders of pregnancy are highly preventable. Life-threatening heavy bleeding, or hemorrhage, is also one of the major risk factors for death and is easily preventable. One way this can be done is to develop checklists that document bleeding over time and interventions to address it; these checklists must be accessible to all members of a health-care team.

Causes of Pregnancy-Related Death in the U.S.

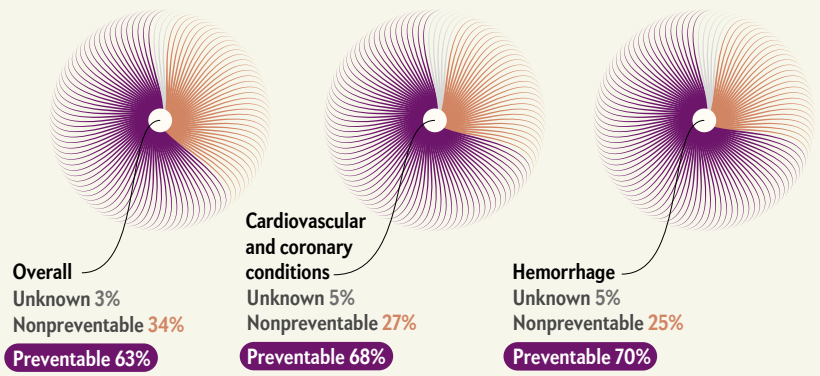
1987–1990 and 2006–2010



There have been significant reductions in pregnancy-related deaths in hypertensive disorders and hemorrhage. MMR rates are dynamic and shift over time.

Distribution of Preventability among Pregnancy-Related Deaths

Per a 2018 report including data from nine states, spanning 2008–2017



About a third of all maternal deaths are considered to be nonpreventable. But the most common conditions associated with maternal mortality, such as heart disease and hemorrhage, can be better handled to avoid poor outcomes.

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How the U.S. Is Tackling the Problem—Or Not

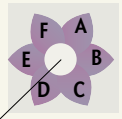
Several groups, including the World Health Organization, have called for a more respectful approach to maternal care. This would be helped by diversification of the health-care workforce so that clinical teams reflect the populations they serve. It also means better communication of knowledge between patients and their health-care teams. One program that embraces these features is called the Alliance for Innovation on Maternal Health (AIM). Funded through the federal Maternal and Child Health Bureau, AIM is a national alliance to promote consistent and safe maternity care, with the initial goal of reducing maternal mortality by 1,000 instances—and severe maternal morbidity by 100,000 instances—between 2014 and 2018. Many states are currently participating. The efforts involved in AIM include hospital-based interventions whereby health-care teams—from obstetricians to emergency room staff—practice simulations of emergencies. The alliance also advocates for increased access to doulas and midwives, as well as a reclamation of normal physiological birth—that is, not treating birth as a disease to be managed.

Which States Are Taking Action?

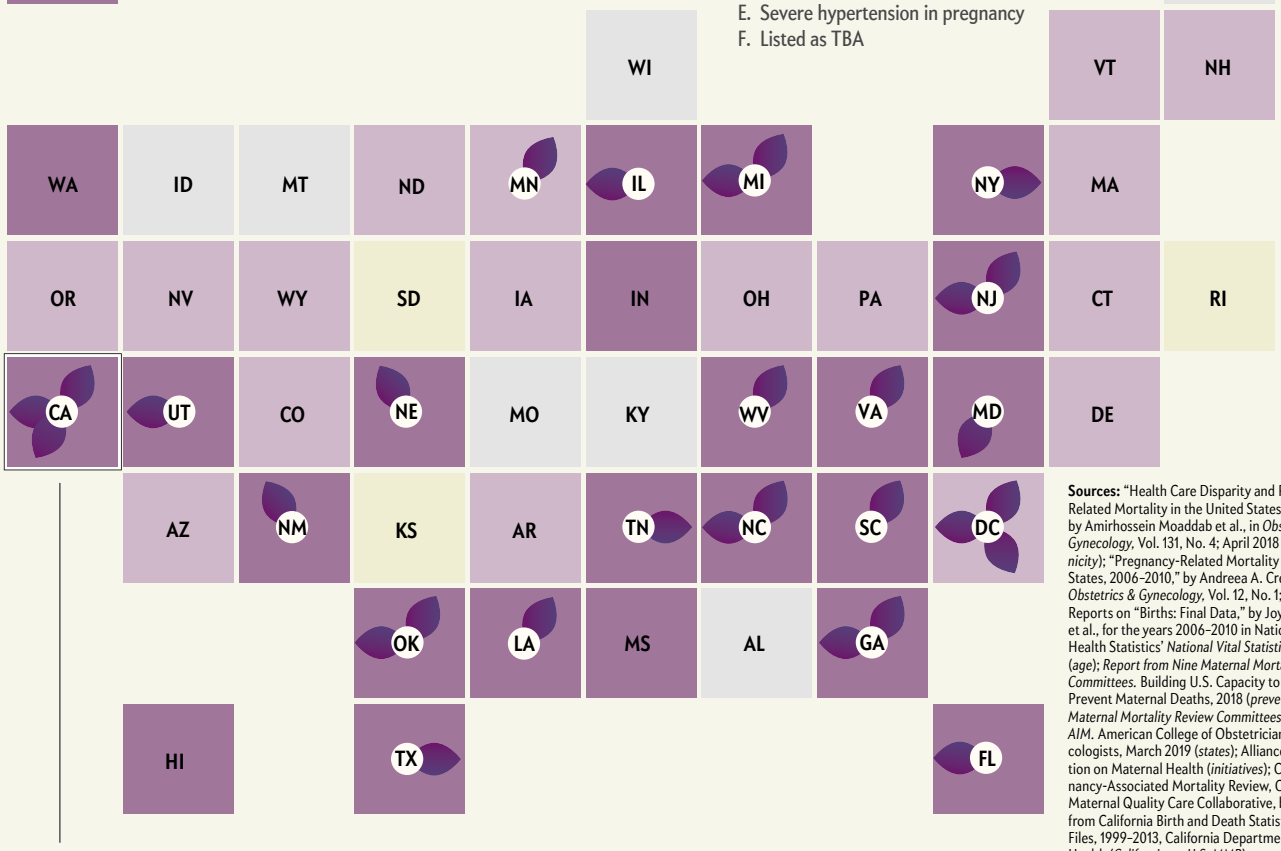
Alliance for Innovation on Maternal Health

KEY

AIM states (as of March 2019)
- AIM states
- States with intent to apply
- States exploring engagement
- No data



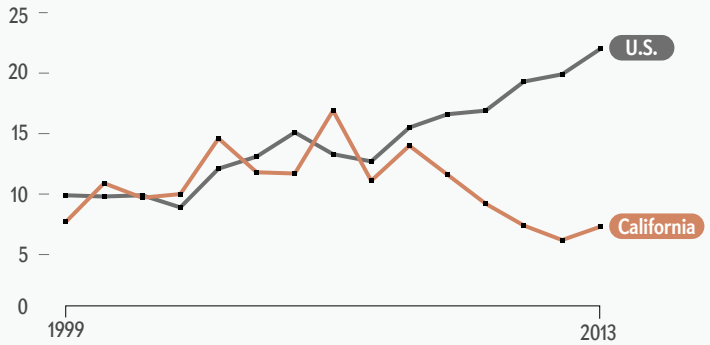
AIM initiatives
- A. Obstetric hemorrhage
- B. Obstetric care for women with opioid use disorder
- C. Reduction of peripartum racial/ethnic disparities
- D. Safe reduction of primary cesarean birth
- E. Severe hypertension in pregnancy
- F. Listed as TBA



Sources: "Health Care Disparity and Pregnancy-Related Mortality in the United States, 2005–2014," by Amirhossein Moaddab et al., in *Obstetrics & Gynecology*, Vol. 131, No. 4; April 2018 (*race and ethnicity*); "Pregnancy-Related Mortality in the United States, 2006–2010," by Andreea A. Creanga et al., in *Obstetrics & Gynecology*, Vol. 12, No. 1; January 2015; Reports on "Births: Final Data," by Joyce A. Martin et al., for the years 2006–2010 in National Center for Health Statistics' *National Vital Statistics Reports* (*age*); *Report from Nine Maternal Mortality Review Committees*. Building U.S. Capacity to Review and Prevent Maternal Deaths, 2018 (*preventability*); *State Maternal Mortality Review Committees, PQCs, and AIM*. American College of Obstetricians and Gynecologists, March 2019 (*states*); Alliance for Innovation on Maternal Health (*initiatives*); California Pregnancy-Associated Mortality Review, California Maternal Quality Care Collaborative, based on data from California Birth and Death Statistical Master Files, 1999–2013, California Department of Public Health (*California vs. U.S. MMR*)

California vs. U.S. Maternal Mortality Rate

Maternal deaths per 100,000 live births (1999–2013)



California Leads the Way

Established in 2006, the California Maternal Quality Care Collaborative (CMQCC) set out to use data-driven approaches to understand the root causes of maternal mortality. A few of their tactics included distributing plain-language tool kits, conducting mock emergencies, making quality improvements in hospital settings and training staff to work more collaboratively. Despite admirable reductions in overall maternal mortality in California, significant racial disparities remain and align with the demographics represented in the national data sets. Keeping Black women alive before, during and after birth was the focus of an innovative hospital-based racial equity pilot program: the SACRED Birth study, launched in 2020 by University of California, San Francisco, associate professor of obstetrics Karen A. Scott. This community-centered study co-led by Black women and community-based organizations provides essential insights on achieving birth equity and justice. Data collection ended at the beginning of 2021, and analysis is underway.

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The Racist Roots of Fighting Obesity

Prescribing weight loss to Black women ignores barriers to their health

By Sabrina Strings and Lindo Bacon

Black people, and black women in particular, face considerable health challenges. Compared with their rates in other racial groups, chronic cardiovascular, inflammatory and metabolic risk factors have been found to be elevated in Black women, even after controlling for behaviors such as smoking, physical exercise or dietary variables.

Black women have also been identified as the subgroup with the highest body mass index (BMI) in the U.S., with four out of five classified as either "overweight" or "obese." Many doctors have claimed that Black women's "excess" weight is the main cause of their poor health outcomes, often without fully testing or diagnosing them. While there has been a massive public health campaign urging fat people to eat right, eat less and lose weight, Black women have been specifically targeted.

This heightened concern about their weight is not new; it reflects the racist stigmatization of Black women's bodies. Nearly three centuries ago scientists studying race argued that African women were especially likely to reach dimensions that the typical European might scorn. The men of Africa were said to like their women robust, and the European press featured tales of cultural events loosely described as festivals intended to fatten African women to the desired, "unwieldy" size.

In the eyes of many medical practitioners in the late 19th century, Black women were destined to die off along with the men of their race because of their presumed inability to control their "animal appetites"—eating, drinking and fornicating. These presumptions were not backed by scientific data but instead embodied the prevailing racial scientific logic at the time. Later, some doctors wanted to push Black men to reform their aesthetic preferences. Valorizing voluptuousness in Black women, these physicians claimed, validated their unhealthy diets, behaviors and figures.

Today the idea that weight is the main problem dogging Black women builds on these historically racist ideas and ignores how interrelated social factors impact Black women's health. It also perpetuates a misinformed and damaging message about weight and health. Indeed, social determinants have been shown to be more consequential to health than BMI *or* health behaviors.

Doctors often tell fat people that dietary control leading to weight loss is the solution to their health problems. But many studies show that the stigma associated with body weight, rather than the body weight itself, is responsible for some adverse health consequences blamed on obesity, including increased mortality risk. Regardless of income, Black women consistently experience weightism in addition to sexism and racism. From workplace discrimination and poor service at restaurants to rude or objectifying commentary online, the stress of these life experiences contributes to higher rates of chronic mental and physical illnesses such as heart disease, diabetes, depression and anxiety.

A 2018 opinion piece co-authored by psychologists, sociologists, and behavioral scientists in the journal *BMC Medicine* argued that bias against fat people is actually a larger driver of the so-called obesity epidemic than adiposity itself. A 2015 study in *Psychological Science,* among the many studies supporting this argument, found that people who reported experiencing weight discrimination had a 60 percent increased risk of dying, independent of BMI (and therefore regardless of body size). The underlying mechanisms explaining this relationship may reflect the direct and indirect effects of chronic social stress.

Additionally, living in racially segregated, high-poverty areas contributes to disease risk for Black women. Low-income Black neighborhoods are often disproportionately impacted by a lack of potable water and higher levels of environmental toxins and air pollution. These factors add to the risk for respiratory illnesses such as asthma and lung disease. They also increase the chance of serious complications from COVID-19.

Further, these neighborhoods typically have a surfeit of fast-food chains and a dearth of grocery stores offering more nutritious food choices. Food insecurity, which is defined as the lack of access to safe, affordable and nutritious foods, has a strong association with chronic illness independent of BMI.

Simply blaming Black women's health conditions on "obesity" ignores these critically important sociohistorical factors. It also leads to a prescription long since proved to be ineffective: weight loss. Despite relentless pressure from the public health establishment, a private weight-loss industry estimated at about $70 billion annually in the U.S., and alarmingly high levels of body dissatisfaction, most individuals who attempt to lose weight are unable to maintain the loss over the long term and do not achieve improved health. This weight-focused paradigm fails to produce thinner or healthier bodies but succeeds in fostering weight stigma.

Chronic diseases such as diabetes or heart conditions are mislabeled "lifestyle" diseases, when behaviors are not the central problem. Difficult life circumstances cause disease. In other words, the predominant reason Black women get sick is not because they eat the wrong things but because their lives are often stressful and their neighborhoods are often polluted.

The most effective and ethical approaches for improving health should aim to change the conditions of Black women's lives: tackling racism, sexism and weightism and providing opportunity for individuals to thrive.

Sabrina Strings is an associate professor of sociology at the University of California, Irvine, and author of *Fearing the Black Body: The Racial Origins of Fat Phobia* (N.Y.U. Press, 2019).

Lindo Bacon (formerly Linda) is an associate nutritionist at the University of California, Davis. They are author of *Health at Every Size: The Surprising Truth about Your Weight* (BenBella, 2010) and *Radical Belonging* (BenBella, 2020) and co-author of *Body Respect* (BenBella, 2014).

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OPINION

Racism in Medical Tests

Many diagnostic assessments are inherently biased against people of color

By the Editors

COVID-19 HAS WREAKED HAVOC on Black and Indigenous communities and other people of color, and U.S. medical institutions should be doing everything they can to root out and eliminate entrenched racial inequities. Yet many of the screening assessments used in health care are exacerbating racism in medicine, automatically and erroneously changing the scores given to people of color in ways that can deny them needed treatment.

These race-based scoring adjustments to evaluations are all too common in modern medicine, particularly in the U.S. To determine the chance of death for a patient with heart failure, for example, a physician following the American Heart Association's guidelines would use factors such as age, heart rate and systolic blood pressure to calculate a risk score, which helps to determine treatment. But for reasons the AHA does not explain, the algorithm automatically adds three points to non-Black patients' scores, making it seem as if Black people are at lower risk of dying from heart problems simply by virtue of their race. This is not true.

A recent paper in the *New England Journal of Medicine* presented 13 examples of such algorithms that use race as a factor. In every case, the race adjustment results in potential harm to patients who identify as nonwhite, with Black, Latinx, Asian and Native American people affected to various degrees by different calculations. These "corrections" are presumably based on the long-debunked premise that there are innate biological differences among races. This idea persists despite ample evidence that race—a social construct—is not a reliable proxy for genetics: Every racial group contains a lot of diversity in its genes. It is true that some populations are genetically predisposed to certain medical conditions—the *BRCA* mutations associated with breast cancer, for instance, occur more frequently among people of Ashkenazi Jewish heritage. But such examples are rare and do not apply to broad racial categories such as "Black" or "white."

The mistaken conflation of race and genetics is often compounded by outdated ideas that medical authorities (mostly white) have perpetuated about people of color. For example, one kidney test includes an adjustment for Black patients that can hinder accurate diagnosis. It gauges the estimated glomerular filtration rate (eGFR), which is calculated by measuring creatinine, a protein associated with muscle breakdown that is normally

OPINION

Clinical Trials Need More Diversity

It's unethical and risky to ignore racial and ethnic minorities

By the Editors

NEARLY 40 PERCENT OF AMERICANS BELONG TO A RACIAL or ethnic minority, but the patients who participate in clinical trials for new drugs skew heavily white—in some cases, 80 to 90 percent. Yet nonwhite patients will ultimately take the drugs that come out of clinical studies, and that leads to a real problem. The symptoms of conditions such as heart disease, cancer and diabetes, as well as the contributing factors, vary across lines of ethnicity, as they do between the sexes. If diverse groups aren't part of these studies, we can't be sure whether the treatment will work in all populations or what side effects might emerge in one group or another.

This isn't a new concern. In 1993 Congress passed the National Institutes of Health Revitalization Act, which required the agency to include more women and people of color in their research studies. It was a step in the right direction, and to be

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cleared by the kidneys. Black patients' scores are automatically adjusted because of a now discredited theory that greater muscle mass "inherent" to Black people produces higher levels of the protein. This practice inflates the overall eGFR value, potentially disguising real kidney problems. The results can keep Black patients from getting essential treatment, including transplants. Citing these issues, medical student Naomi Nkinsi successfully pushed the University of Washington School of Medicine to abandon the eGFR race adjustment in 2020. But it remains widely used elsewhere.

A 2019 study in *Science* examined an algorithm used throughout the U.S. health system to predict broad-based health risks. The researchers looked at one large hospital that used this algorithm and found that, based on individual medical records, white patients were actually healthier than Black patients with the same risk score. This is because the algorithm used health *costs* as a proxy for health *needs*—but systemic racial inequality means that health-care expenditures are higher for white people overall, so that the needs of Black people were being underestimated. In an analysis of these findings, sociologist Ruha Benjamin, who studies race, technology and medicine, observes that "today coded inequity is perpetuated precisely because those who design and adopt such tools are not thinking carefully about systemic racism."

The algorithms that are harming people of color could easily be made more equitable, either by correcting the racially biased assumptions that inform them or by removing race as a factor altogether when it does not help with diagnosis or care. The same is true for devices such as the pulse oximeter, which is calibrated to white skin—a particularly dangerous situation in the COVID pandemic, where nonwhite patients are at higher risk of serious lung infections.

Leaders in medicine must prioritize these issues now to give fair and often life-saving care to the people left most vulnerable by an inherently racist system. SA

sure, the percentage of women in clinical trials has grown significantly since then.

But participation by minorities has not increased much at all: a 2014 study found that fewer than 2 percent of more than 10,000 cancer clinical trials funded by the National Cancer Institute focused on a racial or ethnic minority. And even if the other trials fulfilled those goals, the 1993 law regulates only studies funded by the NIH, which represent a mere 6 percent of all clinical trials.

The shortfall is especially troubling when it comes to trials for diseases that particularly affect marginalized racial and ethnic groups. For example, Black Americans are more likely to suffer from respiratory ailments than white Americans are; however, as of 2015, only 1.9 percent of all studies of respiratory disease included minority subjects, and fewer than 5 percent of NIH-funded respiratory research included racial minorities.

The problem is not necessarily that researchers are unwilling to diversify their studies. Members of minority groups are often reluctant to participate. Fear of discrimination by medical professionals is one reason. Another is that many ethnic and racial minorities do not have access to the specialty care centers that recruit subjects for trials. Some may also fear possible exploitation, thanks to a history of unethical medical testing in the U.S. (the infamous Tuskegee experiments, in which Black men were deliberately left untreated for syphilis, are perhaps the best-known example). And some minorities simply lack the time or financial resources to participate.

The problem is not confined to the U.S., either. A study of trials involving some 150,000 patients in 29 countries at five different time points over the past 21 years showed that the ethnic makeup of the trials was about 86 percent white.

Drug regulators such as the Food and Drug Administration should create and enforce tougher requirements: for a drug to be approved for market, the patient panels of its clinical trials should closely resemble the makeup of the patient populations who will actually use the candidate medicine. And drugmakers should adopt their own testing policies, including strong standards for diverse patient groups.

The FDA currently requires drug developers to provide extra test results for a candidate drug that may have applications in a special age population—say, older patients. It could apply those same criteria regarding race and ethnicity. These requirements could even extend to a more diverse array of genetic subtypes. Some medicines are ineffective or dangerous in certain genetic populations. For example, carbamazepine, a medication used to treat epilepsy, can cause a severe skin disorder in patients with a particular gene variant found in some people of Asian heritage.

In 2015 the FDA launched the Drug Trials Snapshots program, which makes public the demographic details of clinical trial participants, including their age, sex and race. But the onus is on the patients and their doctors to seek out that information.

It's unethical and dangerous to approve drugs without making every attempt to certify their safety and efficacy. Yet by failing to include members of racial and ethnic minorities in clinical trials, that is just what the FDA is doing. SA

Illustration by Deborah Lee

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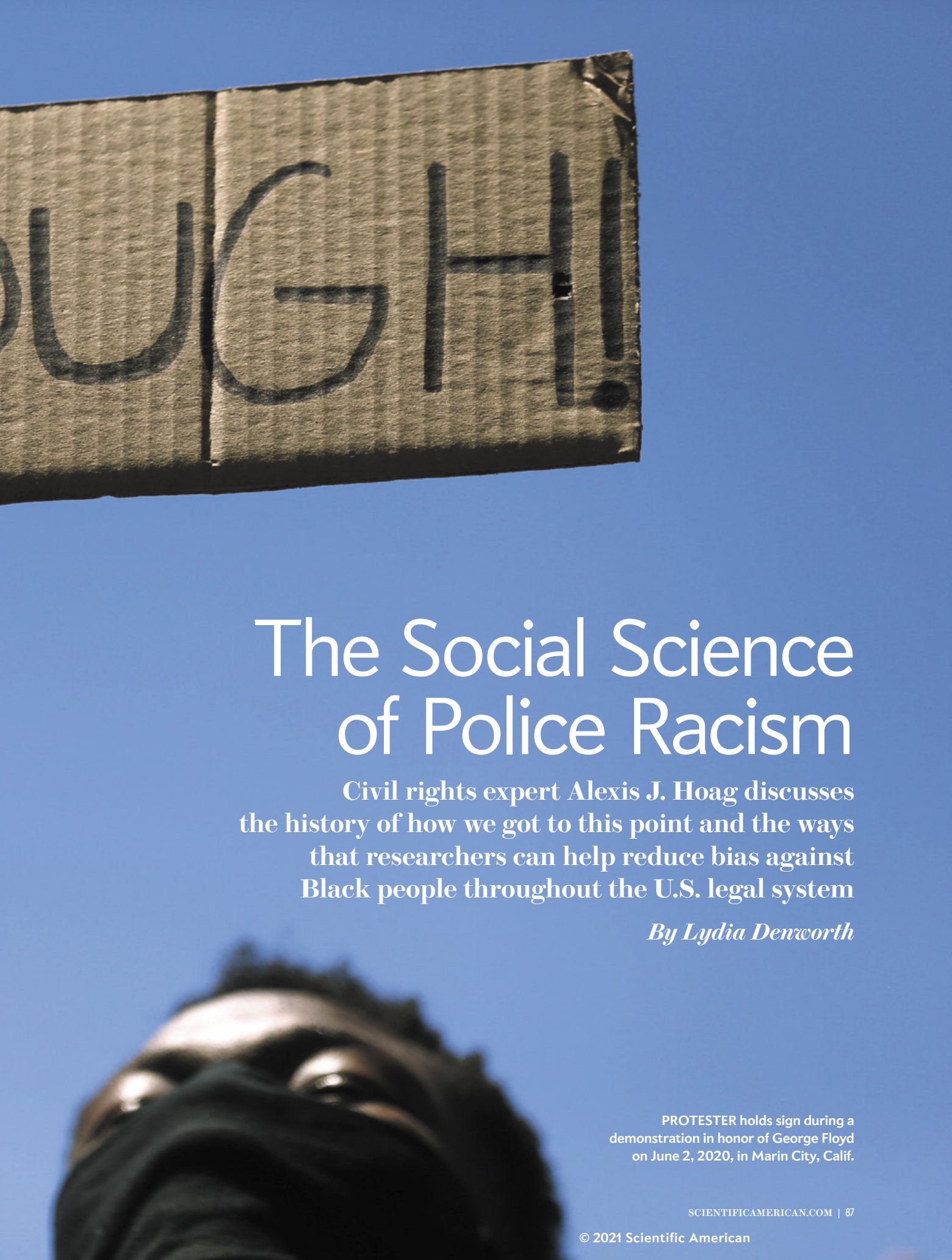

The Social Science of Police Racism

Civil rights expert Alexis J. Hoag discusses the history of how we got to this point and the ways that researchers can help reduce bias against Black people throughout the U.S. legal system

By Lydia Denworth

PROTESTER holds sign during a demonstration in honor of George Floyd on June 2, 2020, in Marin City, Calif.

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IN A NOW INFAMOUS EVENT CAPTURED ON VIDEO, ON MAY 25, 2020, GEORGE FLOYD, a 46-year-old Black man, was killed by a Minneapolis police officer outside of a corner store. Derek Chauvin kneeled on Floyd's neck for nine minutes and 29 seconds while two other officers helped to hold him down and a third stood guard nearby. Nearly a year later, in April 2021, a jury convicted Chauvin of second-degree murder, third-degree murder and second-degree manslaughter. He could face decades in prison (sentencing was expected on June 25). In a highly unusual development, other police officers, including the Minneapolis chief of police, testified against Chauvin.

The three other officers involved, Thomas Lane, J. Alexander Kueng and Tou Thao, were indicted on a range of state and federal charges, including violating Floyd's constitutional rights, failing to intervene to stop Chauvin, and aiding and abetting second-degree murder and second-degree manslaughter. Their trial is scheduled for March 2022.

The 2014 shooting death of Black teenager Michael Brown in Ferguson, Mo., sparked a renewed emphasis on racism and police brutality in the U.S.'s political and cultural conversation. In the past few years many names have been added to the list of Black people killed by police. Despite some efforts to acknowledge and grapple with systemic racism in American institutions, anger and distrust between law enforcement and Black Americans have remained high. But Floyd's death sparked a new level of outrage. Protests erupted in hundreds of cities around the U.S. in the summer of 2020. Most demonstrations were peaceful. But some turned violent, with police using force against protesters and a small percentage of people setting fire to police cars, looting stores, and defacing or damaging buildings. By July the demonstrations were thought to be the largest protest movement in American history, with some 15 million to 26 million people estimated to have taken part.

In addition to the criminal charges against the officers, Floyd's death has prompted U.S. Justice Department investigations into the practices of the Minneapolis Police Department. And Democrats in Congress are hoping to pass criminal justice reform legislation named for Floyd. Both reflect the interests of the new administration since Joe Biden took office in January 2021.

In June 2020, at the height of the protests, Scientific American spoke with civil rights attorney Alexis J. Hoag. Hoag is the inaugural practitioner in residence at the Eric H. Holder, Jr., Initiative for Civil and Political Rights at Columbia University. She works with both undergraduates and law school students at Columbia to introduce them to civil rights fieldwork (which she describes as "real issues, real clients, real cases"). Hoag was previously a senior counsel at the NAACP Legal Defense and Educational Fund. Scientific American asked her to share her perspective on the history that has brought the U.S. to a breaking point—and her ideas for how to make substantive improvements in how law enforcement and courts treat Black people in the country.

Why are we seeing this level of protest now?

I think it's a combination of things. COVID-19 [has had a] disproportionate impact on Black people because of long-standing structural inequalities. Black people are more likely to live in hypersegregated low-income areas that are underresourced. And Black people are more prone to the very preexisting conditions that make people vulnerable to COVID-19 because of structural inequality and lack of access to health care. We've all been cooped up for 10 to 11 weeks. Forty million people [in the U.S.] are unemployed. And there was something egregious about the video that circulated of George Floyd being executed for the suspicion of tendering a counterfeit $20 bill. And I want to stress "suspicion" because we still don't know. That became a death sentence for him.

The violence that has been rendered against Black bodies has gone on for centuries. Now it's out there for everyone to see. And the response, which is hopeful and heartening to me, is that people—not just Black Americans—in this country are really disturbed and appropriately so.

What are the important historical factors that have led up to this point?

I lean so heavily on the unique history of this country and the fact that we enslaved people, Black people. To hold people in bondage as property, you had to look at them as less than human. You see that continuing to happen today in [what] I refer to as the criminal legal system, not the justice system, because it is not just. We are not there yet. As an appellate attorney, I read a lot of transcripts of trials. And the level of dehumanization that prosecutors use to refer to Black criminal defendants is striking. It's

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the verbiage used, that the defendant was "circling" and "hunting" the victim. What hunts and circles? Animals. When you can dehumanize an individual, of course, you can put the person away for a long time, you can sentence him or her to death. And of course, you can put your knee on somebody's neck for nine minutes because you see them as less than human. It's a combination of the dehumanization of Black people with the presumption of dangerousness and criminality.

Is racism getting worse? Or has the ubiquity of cell phones and video recordings simply made us more aware of it?

These issues are getting amplified; they're getting recorded. I think back to the early 1990s and Rodney King's videotaped beating. That really galvanized people around this issue—an issue that many Black Americans were intimately aware of already—and put it out there for the world to see. Then the response after those officers were acquitted was public demonstrations in 1992 in Los Angeles. I think people would not have been as engaged if we didn't have that image. Now we walk around with [cameras] in our pockets.

How does the seeming increase in white nationalism fit in?

I don't know that I would call it an increase. White nationalists, known earlier as white supremacists, first rallied [more than] 150 years ago to violently limit the freedom of newly emancipated Black Americans. Despite federal legislation extending the benefits of citizenship to Black people, white supremacists passed state laws codifying inequality and used violence and intimidation to curtail any Black exercise of freedom. What's happening now [in June 2020] is that we have [a presidential] administration that welcomes and encourages white nationalist views and activities.

Have events in Ferguson and other cities, and the Black Lives Matter movement as a whole, had any effect on policing?

Ferguson was a massive wake-up call. There was a brief glimmer of hope. There was a mechanism in place: the Law Enforcement Misconduct [Statute]. It [is] a federal law the Department of Justice could rely on to investigate Ferguson, to investigate police misconduct in Baltimore [where Freddie Gray, a 25-year-old Black man, died while being transported in a police vehicle in what was ruled to be a homicide]. That law was grossly underutilized by Attorney General William Barr. Who the administration is and who the chief law-enforcement officer of this country is—the attorney general of the U.S.—makes a difference. We've seen a massive rollback in the responsiveness of the [Trump] administration [in taking] a hard look at injustice and at rampant police misconduct.

The other step back that the country has taken is to characterize officers involved in misconduct as "a few bad apples." I think we all need to admit that it's not a few bad apples; it's a rotten apple tree. The history of policing in the South [was driven in part by] slave patrols that were monitoring the movement of Black bodies. And in the North, law enforcement was privately funded [and often involved protecting property and goods]. The police got started targeting poor people and Black people.

What would you like to see happen now?

I think there needs to be a really hard conversation nationally and within law enforcement. To use force, police officers have to reasonably believe that their lives are in danger. What is it about Black skin that makes law enforcement feel threatened for their lives? In addition, there are legal mechanisms that need to be examined. "Qualified immunity" as a defense to police misconduct was judicially created in 1982. It shields government officials from being sued for discretionary actions that are performed within their official capacities unless the action violates clearly established federal law. Somebody who is suing an officer for tasing someone while they're handcuffed has to find a case from the U.S. Supreme Court or the highest court of appeals in their jurisdiction that says that exact act—being handcuffed and tased—is unconstitutional. This is a massive hurdle for a plaintiff.

What are social scientists and researchers doing to help?

Data are currency. We can create a national database of officer misconduct. You have officers such as Derek Chauvin, who had 18 complaints against him and [was] still allowed to operate within the [Minneapolis Police] Department.

The data collection that happens within police departments enabled experts in the stop-and-frisk litigation [against] the [New York City Police Department] to shine a spotlight on gross disparities: the rate of stops and searches of Black and brown men and boys [coupled with] the low rate of actually acquiring contraband. They found that the rate of securing contraband from white individuals who had been stopped and frisked was so much higher because the police were actually using discretion.

There's powerful data collection that happens in our criminal courts. Studies show that, all factors being equal, judges are rendering longer and harsher sentences for Black defendants. These judges are setting higher bail. You can isolate all these other factors, but race is the difference. That's very powerful—to be able to document and publish those findings.

There has also been some really good social science research on implicit bias and the way that it operates. We could all take [implicit association tests] on our computers. You could do a training with your employees. To start with, there is this recognition, this acknowledgment, that we all have implicit bias.

And how do we use that information and not just let people off the hook?

Let's talk about it. Social science research shows that when there's recognition that we harbor implicit bias, that awareness can help mitigate [such] bias impacting our daily interactions and decisions.

What about people's decision to protest during the pandemic? Are you worried that protesters will get sick and spread COVID-19?

Of course. I worry that there will be a second wave of infections. But I think that also speaks to how pressing the issue is and how strongly people feel about it—that they are risking their lives to bring attention to the rampant and lethal mistreatment of Black and brown bodies at the hands of law enforcement. SA

Lydia Denworth is a Brooklyn, N.Y.–based science writer, a contributing editor for *Scientific American,* and author of *Friendship: The Evolution, Biology, and Extraordinary Power of Life's Fundamental Bond* (W. W. Norton, 2020).

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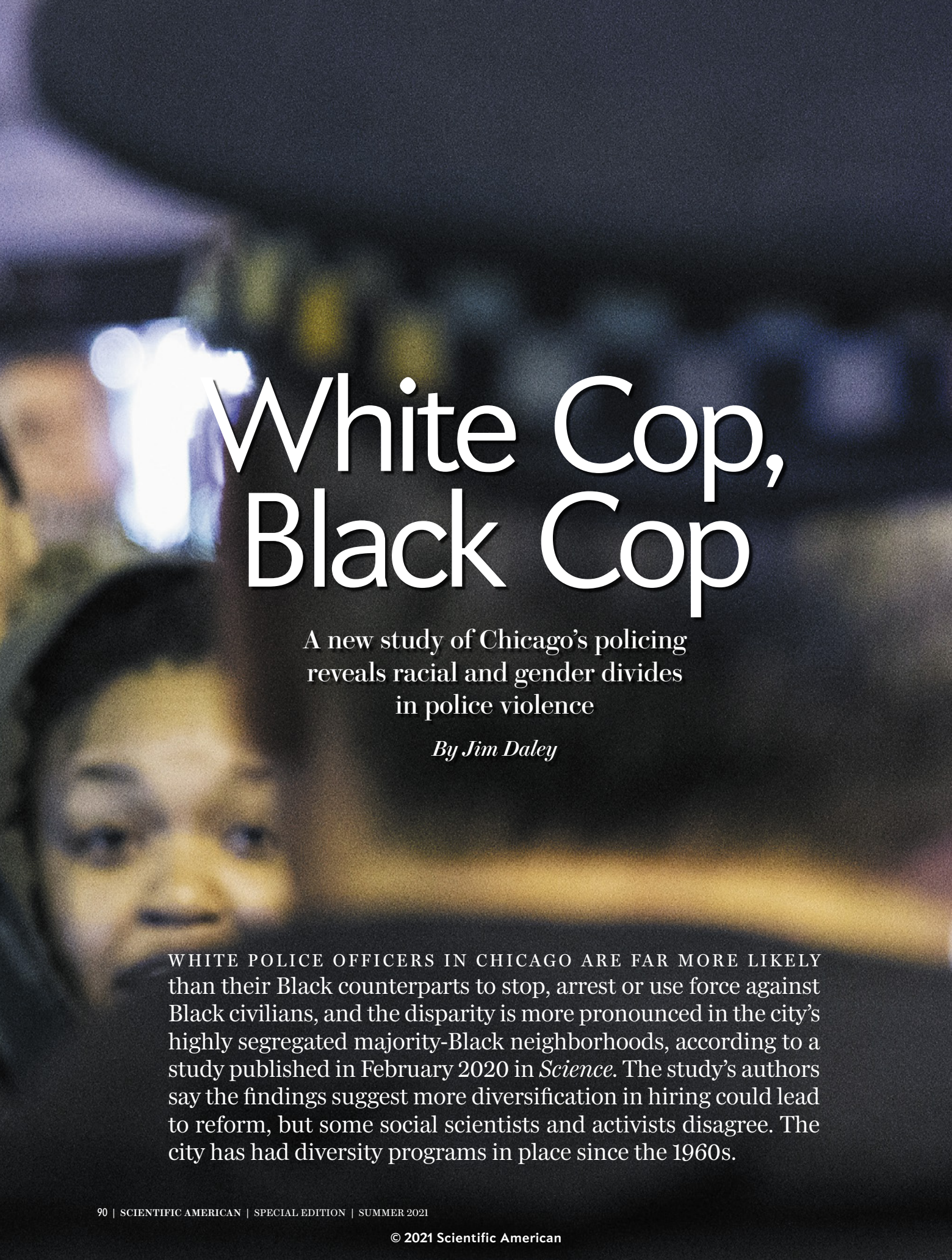

White Cop, Black Cop

A new study of Chicago's policing reveals racial and gender divides in police violence

By Jim Daley

WHITE POLICE OFFICERS IN CHICAGO ARE FAR MORE LIKELY than their Black counterparts to stop, arrest or use force against Black civilians, and the disparity is more pronounced in the city's highly segregated majority-Black neighborhoods, according to a study published in February 2020 in *Science*. The study's authors say the findings suggest more diversification in hiring could lead to reform, but some social scientists and activists disagree. The city has had diversity programs in place since the 1960s.

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DEMONSTRATORS confront police during a protest in November 2015 over the death of Laquan McDonald in Chicago the year before.

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The researchers compiled data from 2012 to 2015 on Chicago Police Department (CPD) officers' race, ethnicity and gender, as well as stops, arrests and use-of-force incidents. They analyzed only records for patrol officers (or "beat" cops), excluding others in specialized units that might, for instance, be policing gangs. White cops were far more likely to use force during an arrest than Black or Latinx officers, and male police were more likely to use force than their female counterparts.

Although there was no significant difference in how many violent-crime arrests officers made, Black and Latinx cops made far fewer stops for "suspicious behavior" and registered fewer arrests for petty crimes such as drug possession than white officers did. "That tells us there's discretion somewhere in that process, and they're exercising that discretion," says study co-author Dean Knox, a computational social scientist at the University of Pennsylvania. "And if there are best practices in policing, both officers"—whether Black or white—"can't be following them."

"The fact that we're comparing officers working in the same circumstances and we're seeing one group of officers use force more often, even though the conditions on the ground are the same, is troubling," adds study co-author Jonathan Mummolo, a political scientist at Princeton University. "And I would think that police departments would want to investigate that."

Cassandra Chaney, a Black families scholar at Louisiana State University, and a co-author of *Police Use of Excessive Force against African Americans* (Lexington Books, 2019), who was not involved in the research, was not surprised at the results. In comparison to white officers, Black cops, Chaney says, are less likely to hold biases that associate Black people with criminality. "One reason is that Black officers have lived in their Black skin all their life and have dealt with racism," she explains. Black officers are also more likely to perceive Black civilians' basic humanity and to develop relationships with the residents of Black neighborhoods they patrol. "Even if a Black person is committing a crime, they're able to see their totality instead of just reducing them to whatever behavior they're engaging in," Chaney adds. Florida A&M University sociologist Ray Von Robertson, Chaney's book co-author, says that disparities in arrest rates and incarceration of Black and white drug users who consume drugs at similar rates suggest that white officers exercise restraint with white civilians. He adds that Black police officers, fearing harsher punishments for misconduct than their white counterparts may face, likely avoid risky behavior.

It is unclear how the results of the new research apply to other cities, given Chicago's long history of tensions between civilians and the police. But study co-author Bocar A. Ba, an economist at the University of California, Irvine, says the research still provides a template for evaluating reform efforts. "What is needed is more data transparency, access to institutional details, and researchers from all across the board," Ba adds. Chicago police have long resisted independent efforts to examine the department's internal operations. Citizen data projects have filled gaps by compiling data on use of force, torture and killings by police. A lawsuit by one such organization, the Invisible Institute, compelled the release of much of the data in the new study.

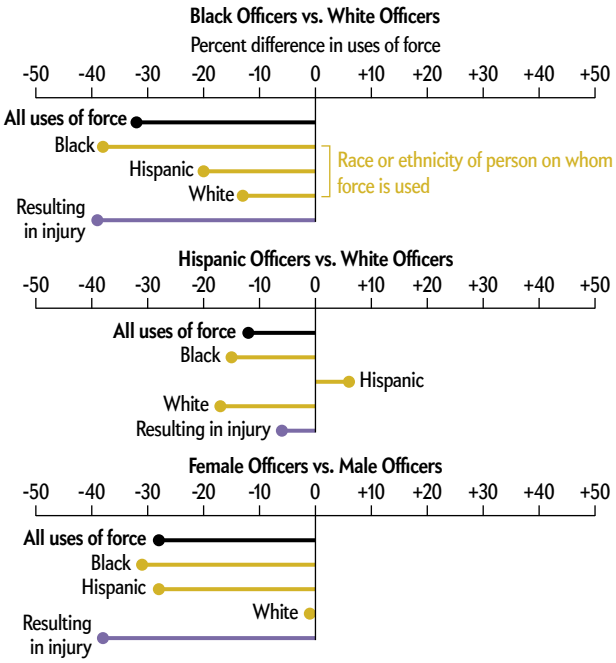
The CPD's first efforts at fostering diversity in hiring began in the 1960s, says Simon Balto, a historian at the University of Iowa, who wrote *Occupied Territory: Policing Black Chicago from Red Summer to Black Power* (University of North Carolina Press, 2019) and was not involved in the new study. A reform-minded superintendent and a lawsuit by the Afro-American Patrolmen's Association drove the CPD to recruit more Black and Latinx officers. But Balto asserts that little changed in Chicago as the police force grew more diverse. "I've seen no evidence that changing the racial composition of the police force, at least at that point in time, resulted in particularly meaningful changes in the larger framework of how policing operated within communities of color," Balto says.

In a statement to *Scientific American,* CPD spokesperson Don Terry says the department has expanded a training program in which neighborhood residents teach recruits about the communities they will be patrolling. The department also requires officers to undergo annual training in implicit bias, or unconsciously held stereotypes and prejudices. "Ensuring that our officers reflect the diversity of Chicago's communities is critical to public safety and constitutional policing," Terry says. A 2018 *Chicago Tribune* analysis found that diversity hiring efforts had not resulted in a significant increase in the number of Black cops in the department; in fact, the percentage of Black officers had decreased. In 2020 the Chicago Office of the Inspector General reported the proportion

Diversity Impacts Policing

A microlevel analysis of the Chicago Police Department's patrolling practices shows that Black, Hispanic and female officers make fewer stops and arrests and use less force than do white male officers, particularly against Black people. The study identified race and gender based on department, city and state records and did not include other groups. The term "Hispanic" encompasses a range of ethnic and national identities and does not necessarily refer to Spanish-speaking ability. Graphs show how increased racial, ethnic and gender diversity among police might affect their interactions with the community, depending on various factors.

Uses of Force


Black Officers vs. White Officers
Percent difference in uses of force
-50 -40 -30 -20 -10 0 +10 +20 +30 +40 +50
All uses of force
Black
Hispanic
White
Resulting in injury
Race or ethnicity of person on whom force is used
Hispanic Officers vs. White Officers
-50 -40 -30 -20 -10 0 +10 +20 +30 +40 +50
All uses of force
Black
Hispanic
White
Resulting in injury
Female Officers vs. Male Officers
-50 -40 -30 -20 -10 0 +10 +20 +30 +40 +50
All uses of force
Black
Hispanic
White
Resulting in injury

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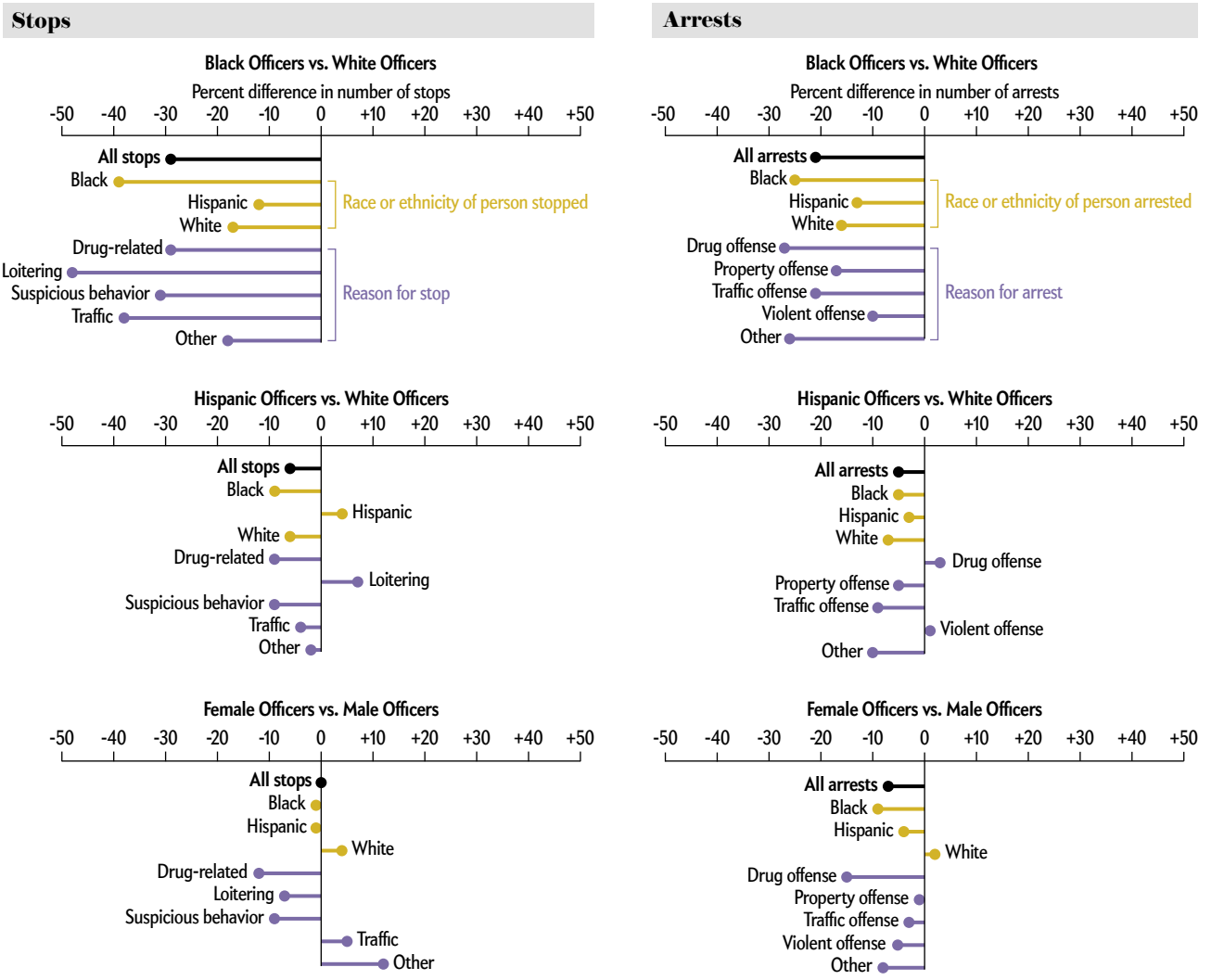

Source: "The Role of Officer Race and Gender in Police-Civilian Interactions in Chicago," by Bocar A. Ba et al., in *Science*, Vol. 371; February 12, 2021

of Black officers is likely to further decrease as officers retire. The department is still under a federal consent decree stemming from the 2014 murder of teenager Laquan McDonald by a Chicago police officer; this 2019 federal court order requires sweeping reforms to discipline, supervision, training and recruiting within the CPD. As of the end of 2020, the department had missed 40 percent of its targeted reforms, according to an independent monitor.

Whether diversity efforts and sensitivity training can reform the department—or if police departments can be reformed at all—remains an open question. Chaney says having more Black officers in majority-Black communities can help. "But you have to put Black officers in there who are actually serving with heart for the communities they're policing," she adds.

Damon Williams, co-founder of the #LetUsBreathe Collective, a police abolitionist organization based in Chicago's Back of the Yards neighborhood that is campaigning to defund the CPD's $1.7-billion budget, says the claim that hiring more Black police officers improves policing is part of a larger push to protect "irredeemable" institutions—namely, police departments. "I don't think that these studies actually get us any closer to centering or repairing the actual harm" caused by police misconduct, Williams says. "I do think it is obvious that Black officers will tend to make better individual choices and be slightly more discriminate," he adds. "But that does not correct or engage what racism is. Racism is not about the temperaments or choices of individual actors. It is a structural dynamic."

Balto says reforms oriented around individual behaviors are unlikely to work. "The institution of policing remains fundamentally racist," he says. "On the one hand, you do have a net positive [with Black police] of fewer stops, arrests and use of force when you have a more diverse police force. But you still have a police force that is operating within a racist superstructure. Part of the challenge is to rethink the very nature of the structure of public safety because the police don't have a good track record of ensuring public safety." SA

Jim Daley is a science journalist based in Chicago. See more of his writing at www.jimdaleywrites.com

Graphic by Amanda Montañez

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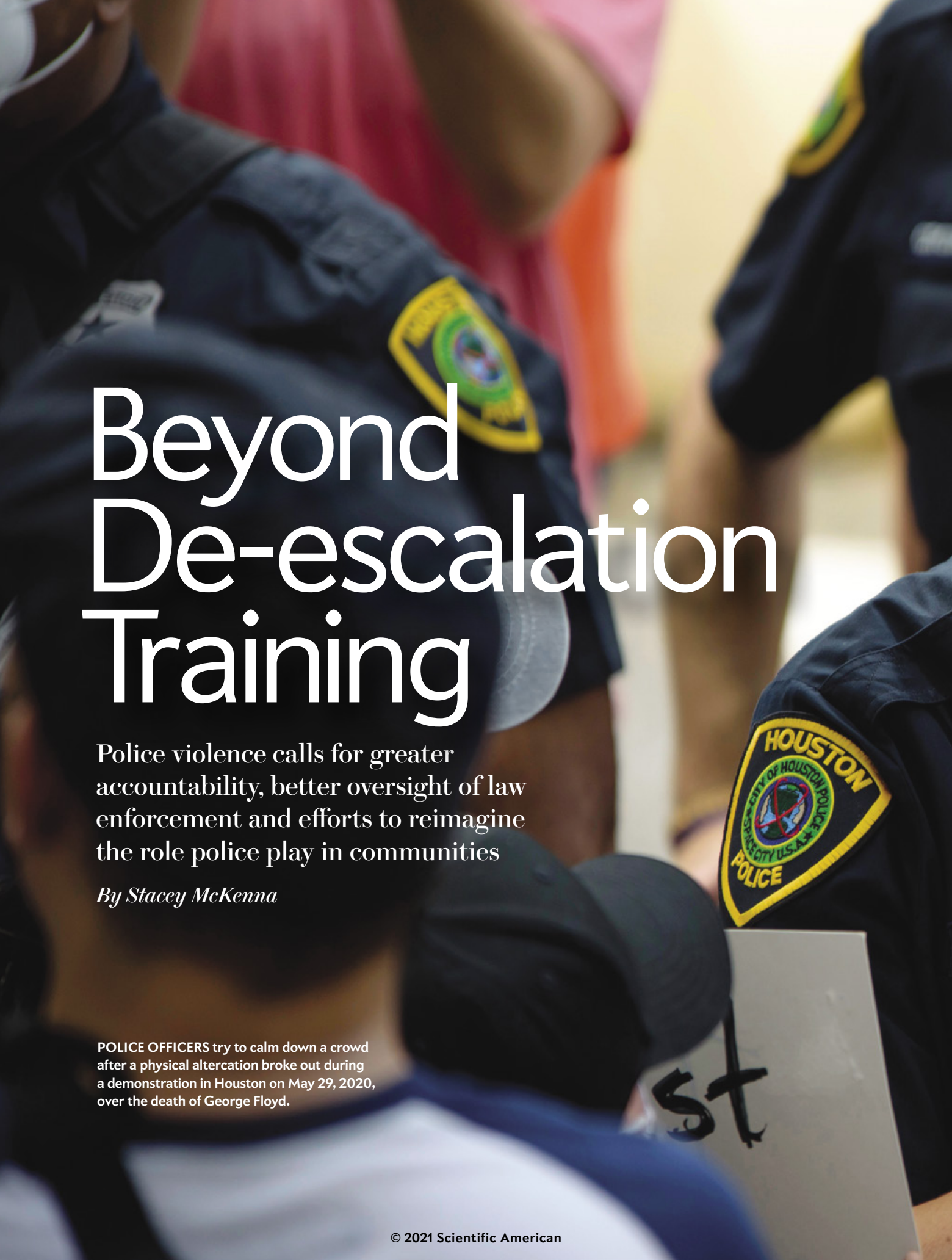

Beyond De-escalation Training

Police violence calls for greater accountability, better oversight of law enforcement and efforts to reimagine the role police play in communities

By Stacey McKenna

POLICE OFFICERS try to calm down a crowd after a physical altercation broke out during a demonstration in Houston on May 29, 2020, over the death of George Floyd.

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BLACK PEOPLE ARE ABOUT THREE TIMES MORE LIKELY THAN white people to be killed by a police officer. Outrage over this long-running and relentless situation boiled over in the summer of 2020, with people across the U.S. taking to the streets to protest the killings of George Floyd, Breonna Taylor, and so many others. The demonstrations—which themselves were largely peaceful—have involved notable incidents of police violence toward protesters. These events have further amplified questions about officers' use of force and one of the most popular strategies aimed at reducing it: de-escalation.

The 2014 police shooting of Michael Brown in Ferguson, Mo., and the surge of civil unrest that followed prompted then president Barack Obama to assemble the President's Task Force on 21st Century Policing. A resulting report called for nationwide changes in law enforcement, with the aim of promoting "effective crime reduction while building public trust." De-escalation was one strategy that subsequently gained many new followers.

Although the approach is widely employed to reduce violence and aggression in health care and mental health settings, its application for law enforcement is poorly defined. In a policing context, de-escalation aims to decrease the use of force against civilians by teaching officers techniques to slow things down and use time, space and communication to find an alternative—practices that run counter to much law-enforcement training. Police are traditionally taught to make decisions and act as quickly as possible. And they learn early on that society not only authorizes but sometimes expects them to use force as a means of coercion.

Unlike strategies that specifically target discrimination—from the racial sensitivity training adopted in the 1980s to more recent implicit bias training—de-escalation is touted by proponents as a means of reducing violence across the board. The approach, they say, protects civilians and officers alike and enables police to peacefully manage crowds of protesters.

De-escalation has become one of the types of training most frequently requested by police departments in recent years, says Robin Engel, a professor at the University of Cincinnati's School of Criminal Justice. A recent CBS News poll of 155 departments indicates that at least 71 percent of them offer some form of de-escalation training, although it is not always mandatory. But U.S. news outlets have reported numerous, often startling stories of police violence against individuals and groups of protesters across the country. Many departments in cities where such uses of force have taken place—including those in Seattle and Phoenix (neither of which responded to requests for comment)—require their officers to undergo training in de-escalation. So why does it often break down?

DE-ESCALATION IS NOT ENOUGH

IN 2016 CAMPAIGN ZERO—a law-enforcement reform initiative developed by Black Lives Matter activists—helped to conduct an analysis of 91 police departments in the largest U.S. cities. The study found that de-escalation mandates were associated with lower rates of police killings and fewer officers being killed or assaulted in the line of duty—even after accounting for a number of departmental and social factors. Although a review of cross-disciplinary research on de-escalation found that such training probably has slight-to-moderate benefits and few drawbacks, much of the research has methodological weaknesses—including a lack of control groups, dependence on correlational designs and use of self-reporting rather than observation-based data. Thus, despite promising early findings, Engel argues that there is not yet enough systematic research about de-escalation in policing to show it is effective or to guide its use.

But what is increasingly clear, she says, is that even effective de-escalation training is probably an insufficient solution if it is used on its own. "We know that training alone doesn't change behavior,"

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Engel says. "So you need a strong use-of-force policy that emphasizes the use of de-escalation tactics. And you need to couple that with accountability and supervisory oversight—and then add in the training component. Agencies that have been doing [these things] are [anecdotally] reporting success." Similarly, Campaign Zero reports that the departments with the lowest rates of police killings and officer deaths employed four or more of the organization's 8 Can't Wait strategies aimed at reducing the use of force. In addition to de-escalation mandates, this campaign calls for measures such as banning choke holds and changing how the use of force is reported.

Still, measures seeking to reduce the violence—or the unevenness in how it is carried out—without addressing its root cause may be seen as inauthentic. For example, law-enforcement officials in some cities have marched and knelt alongside protesters. Such actions—viewed by many as a show of solidarity—have served to de-escalate heated situations, but some question the sincerity of these gestures.

"De-escalation is a code word for pacification," says Christen Smith, an associate professor of anthropology and African and African diaspora studies at the University of Texas at Austin. "Policing in the Americas uses code words in order to try to frame violent actions as something less violent than what they really are," adds Smith, who researches state violence in the region, with focuses on Brazil and the U.S. She contends that calls for de-escalation training—especially in the absence of more comprehensive change—can be used as a political tool to "gift wrap violence in a prettier package" rather than a method to reconfigure the system to keep communities safe in ways that feel equitable.

WHAT WORKS

SOME ACTIVISTS and law-enforcement officials say it may be possible to change police departments—or the criminal justice system itself—to accomplish that goal. Indeed, the communities that have demonstrated success have taken a comprehensive approach to reducing police violence. The police department in Camden, N.J., for example, was disbanded and rebuilt with a new vision in 2013.

"We try to meet the community before anything is an emergency, before there is a crisis," says Camden police captain Zsakhiem R. James. "We partner with the community, so we're not seen as an occupying force." In addition to such engagement—which sometimes means hosting and attending barbecues and block parties—the department now has a strict and clear use-of-force policy, as well as extensive and ongoing training in de-escalation. This training includes scripts and virtual role-playing, along with thorough oversight procedures such as monitored body cameras, James says. What is more, he adds, the department has a deep commitment to this different approach to policing. "This entire department is community-based," he says. "If you can't abide by our policies, you just don't need to work here. People employed by us and working for us must abide by it."

This type of multipronged strategy to address state-authorized violence and change the face of policing in the U.S. has been gaining traction. Minneapolis has vowed to dismantle its own police department and replace it with a community-led alternative. And state and national lawmakers have introduced bills that would restrict the use of force, increase civilian oversight and develop tracking systems for officer misconduct. On June 3, 2020, the Law Enforcement Action Partnership (LEAP) released several recommendations to local, state and national officials that integrate immediate interventions (including de-escalation) aimed at reducing the use of force with system-wide accountability and steps toward structural change.

DE-ESCALATION TRAINING CAN BE USED AS A POLITICAL TOOL TO "GIFT WRAP VIOLENCE" RATHER THAN AS A POLICING METHOD TO KEEP COMMUNITIES SAFE.

"Law enforcement is the dumping ground. When you don't know who to call, you call the cops," says former police officer Kyle Kazan, who is now a speaker for LEAP. "You have to take a step back and ask, 'What does society need law enforcement for?' We need to rethink how we handle society's challenges." He argues that ending the War on Drugs, increasing funding for dedicated social workers and outreach workers, and ensuring that officers are held liable for their actions within and across departments would better position law enforcement to help communities.

Such interventions, as well as the movement to defund the police, start to address one of Smith's major critiques of a reformist approach that stops at training. "There's a deep-rooted connection between the way that we understand justice in this country, white supremacy and anti-Blackness," she says, noting that modern policing in the U.S. grew, in part, out of slave patrols in the South. "How do you undo that culture? As anthropologists, we know that the only way cultures die is when they disappear into history because of some catastrophic event [such as the collapse of a nation or descent into civil war]. What our generation is tasked with is trying to figure out a way to dismantle this culture without a catastrophic event." SA

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OPINION

How to Reinvent Policing

Departments have turned into enemies of communities they are sworn to protect

By the Editors

IT WAS NOT JUST A KNEE PINNED TO GEORGE FLOYD'S NECK THAT KILLED HIM. OR GUNSHOTS that killed Breonna Taylor. Or a choke hold that killed Eric Garner. It was also centuries of systemic racism that have festered in U.S. society and institutions, including our overly punitive, adversarial system of policing. And videos of the recent police-involved killings do not show the broader toll that stop and frisk, arbitrary arrests and other aggressive law-enforcement actions have taken on Black and other minority communities. Nationwide and fundamental police reform is long overdue.

Since the advent of government-led "wars" on crime and drugs in the past decades, policing has taken a decisively violent turn, and police departments often see themselves as adversaries of the very communities they are meant to safeguard, according to policing researcher Peter Kraska of Eastern Kentucky University. In addition to this antagonistic culture, several studies show that police are more likely to stop, arrest and use force against Black and Latinx people than white people. Research by Yale University sociologist Monica Bell documents that individuals subject to such overpolicing do not see police as protecting them, even when they are concerned about violence in their communities. They report unease even after an encounter where officers acted appropriately.

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Incremental reforms will not fix this perverse system: Choke holds have been banned in New York City for decades, and the Minneapolis Police Department requires officers to intervene when a fellow officer uses excessive force, but neither rule prevented the death of Garner or Floyd. Nor will technology turn the tide. Body cameras have made the problem of police brutality against minority communities harder to ignore but have not reined it in.

Instead we need to rethink how we conceive of and support public safety so that it encompasses all communities. One way to do this would be to create policies that use social workers to tackle issues that have been dropped at the feet of police who are ill trained to handle them, such as homelessness, mental illness and working with young people to prevent violence. Law-enforcement professionals themselves have highlighted this problem, and some alternative programs point toward solutions.

For example, community-based violence-prevention groups such as Cure Violence have lowered shootings and killings in cities such as Baltimore and Philadelphia where they have operated, according to policing researcher Alex Vitale of Brooklyn College. And programs such as CAHOOTS in Eugene, Ore.—which routes emergency calls about mental illness to social workers instead of the police—and the Denver Alliance for Street Health Response offer models for other cities to explore. Taking responsibility for dealing with these noncrime issues out of the hands of police removes officers from situations beyond their training and reduces the chances of encounters escalating to violence. Fewer than 1 percent of the thousands of calls CAHOOTS responded to in 2019 necessitated police backup, the group reports. In designing these policies, officials must engage communities—particularly those who have suffered most from overpolicing—to understand what issues are most important to them in ensuring safety.

A necessary step will be to address the militarization of policing. The use of SWAT teams and tactics has ballooned well beyond the threatening hostage or active-shooter situations they were intended to confront. Studies by Kraska, the American Civil Liberties Union, and others show SWAT teams are overwhelmingly used for serving search warrants and that communities of color are disproportionately targeted. Returning SWAT to its proper use—and restricting the access of wider police departments to military-style weapons or dogs trained to bite people—would reduce the chances for unnecessary violence and harm.

RETURNING SWAT TEAMS AND TACTICS TO THEIR PROPER USE WOULD REDUCE THE CHANCES FOR UNNECESSARY VIOLENCE.

Accountability is another key element. Federal and local officials need the political will to create truly independent oversight mechanisms. But accountability also depends on police departments making data on killings, use of force, disciplinary records, budget allocations and other areas publicly available. Departments have resisted releasing such information, so Congress needs to pass laws that mandate that they do so.

Major police reform will take perseverance and money. (Some of the financing can come from reducing police budgets.) These approaches are a starting point as we tackle the way dangerous biases, especially racism, have become embedded in police and other powerful institutions. We must work to root them out. SA

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The Environmental Cost of Inequality

Power imbalances facilitate environmental degradation—and the poor suffer the consequences

By James K. Boyce

IN THE FALL OF 2016 AN ENVIRONMENTAL STRUGGLE IN RURAL NORTH DAKOTA made headlines worldwide. The local Standing Rock Sioux Tribe and climate activists were pitted against the corporate and government backers of the Dakota Access Pipeline, which was being built to carry oil from the state's Bakken shale fields to a terminal in Illinois. Private security guards unleashed attack dogs on protesters, and the police blasted them with water cannons in freezing weather.

The tribe feared that a leak in the pipeline as it crossed under a reservoir along the Missouri River would contaminate its water supply. Climate activists joined the protest to fight ramped-up extraction of fossil fuels. Supporters of the $3.8-billion project argued that it would save the oil industry money, being less costly than the alternative of oil shipment by rail, and that its construction would bring jobs with multiplier effects to the local economy. Because the price of oil is set on world markets, the cost saving would not mean lower prices for consumers—but it would bring higher profits to producers.

By December 2016 the U.S. Army Corps of Engineers announced that it would deny approval for the pipeline crossing, a decision greeted with whoops of joy at the protesters' encampment. But four days after taking office in January, President Donald Trump overturned the ruling, and a few months later the oil began to flow.

The battle reflected what seems to be a basic reality: When people who could benefit from using or abusing the environment are economically and politically more powerful than those who could be harmed,

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the imbalance facilitates environmental degradation. And the wider the inequality, the more the damage. Furthermore, those with less power end up bearing a disproportionate share of the environmental injury.

We see these situations all around us. Polluting power plants and hazardous waste dumps are located in poor neighborhoods. Drinking-water impurities afflict minority communities. But is this relation between power and environmental degradation consistently true? If so, why? And what can we do about it? At Standing Rock, the balance between the opposing sides was close; Trump's election was enough to tip the scales. But the experience, along with some recent shifts in power balances, offers lessons—and even hope—that efforts to reduce economic and social inequality will be good not only for people but also for the environment.

GREATER INEQUALITY, GREATER HARM

RESEARCH on the connection between social power and environmental degradation began in earnest in the 1990s. Economists reported that they had found an inverted U-shaped relation between pollution and per capita income. They plotted air and water pollution on the *y*-axis of a graph and average income on the *x*-axis, comparing dozens of countries. Pollution initially increased as income went from $0 to a turning point of up to about $8,000 a year. But after that, pollution decreased as income rose further. This became known as the environmental Kuznets curve because of its similarity to the relation between inequality and average income found in a famous 1955 study by economist Simon Kuznets.

The environmental Kuznets curve appeared to offer respite from the bleak assumption that rising production and consumption necessarily lead to more environmental damage. Maybe humans were not, as environmental historian Roderick Nash once put it, a "cancerous" species whose growth "endangers the larger whole." A spirited debate ensued among analysts who saw economic growth as the solution to environmental woes and those who still saw it as the crux of the problem.

I was not convinced by either side. Maybe that was because in my 20s, I had lived among some of the world's poorest people in a Bangladesh village. That experience left me with the indelible understanding that human societies cannot be neatly summed up by population or per capita data. Many Bangladeshis went hungry but not because the country had too many people or too little food per person. There was enough food for everyone, yet communities starved because the poor lacked the purchasing power to buy it in the market and the political power to obtain it by other means. In his 1981 book *Poverty and Famines,* economist Amartya Sen explains that famines typically arise from similar realities. Inequality in the distribution of wealth and power seems to be central to how societies function and malfunction.

In thinking about the original and environmental Kuznets curves, it occurred to me that inequality, not per capita income, might underlie environmental degradation: the two seemed to rise and fall together. When then Ph.D. student Mariano Torras and I reanalyzed the environmental Kuznets curve data in 1998, we found that countries with lower rates of adult literacy, fewer political rights and civil liberties, and higher income inequality—which we considered to be indicators of more unequal distributions of power—tended to have more polluted air and water. After controlling for these indicators, the apparent effect of per capita income weakened, and for some pollutants, it disappeared entirely. We also found that greater inequality was associated with less access to clean drinking water and sanitation facilities, both crucial to the environment and human well-being.

In a 1999 follow-up study, my co-authors and I examined the 50 U.S. states. We analyzed the relation between the strength of state environmental policies and the distribution of power, using as proxies the rate of voter participation, the percentage of adults completing high school, tax fairness and Medicaid access. We found that wider inequality was associated with weaker environmental policies and that weaker policies were associated with more environmental stress and poorer public health. These results suggested that the pathways by which inequality adversely affects health include not only physiological stress, violence and reduced access to health care—all of which had been documented by public health researchers—but also impacts on the environment.

The initial reactions to our findings were decidedly cool. In the 1990s, when free markets and deregulation were all the rage, concerns about inequality were brushed aside as passé, maybe even soft-headed. One reviewer claimed that I was "beating a dead horse."

In the 2000s, however, inequality reemerged as a central political issue. The growing gap between the "1 percent" and everyone else, the terrible toll of Hurricane Katrina on low-income residents in New Orleans and the economic dislocations that followed the 2008 financial crisis all helped to put it back on the agenda. At the same time, evidence mounted that more concentrated wealth and political power leads to worse environmental performance—and not just in terms of air and water pollution. Researchers found that the proportion of plants and animals threatened with extirpation or extinction is higher in countries with more unequal income distributions. Rates of deforestation are higher in countries with greater corruption. Public expenditure on environmental research and development and patents on environmental innovations are lower in industrial nations with greater income inequality. More inequality has also been linked to higher carbon emissions per person and per unit of gross domestic product.

These findings make sense when we consider that with less inequality, people are better able to defend the air, water and natural resources on which their health and well-being depend. Protecting the environment and reducing inequality go hand in hand.

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POWER RULES

ANY ACTIVITY THAT CAUSES environmental degradation generates winners as well as losers. The activity benefits some people—otherwise no one would pursue it. And some people bear the costs—otherwise the degradation would not be seen as a problem. This poses a basic question: Why can those who benefit from such activities impose environmental costs on others?

There are three possible answers, all of them related to power disparities. One is that the costs are deferred, borne by future generations, who are not here today to defend themselves. In such cases, as when we think of the long-term impacts of climate change, the only way to safeguard the environment is for those of us who are alive to take responsibility toward those "whose faces are yet beneath the surface of the ground, the unborn of the future Nation," in the words of the Iroquois Constitution.

A second possibility is that people who are harmed are unaware of being hurt or do not know where the harm comes from. They may realize, for example, that their children are getting sick but not that the illness can be traced to emissions from a nearby refinery or power plant. In such cases, the solution lies in greater access to knowledge and, in particular, in policies that guarantee the public's right to know about environmental hazards and their sources.

The final possibility is that even when people are well aware that they are bearing the brunt of environmental costs and know the sources, they lack sufficient economic and political power to prevail in social decisions about the use and abuse of the environment. Standing Rock is an example. The solution in such cases is to change the balances of power.

Government decisions affecting the environment often invoke a cost-benefit analysis: How much benefit can be gained and at what cost? In this calculation, economic power (also known as purchasing power) plays a key role. People with more dollars effectively wield more "votes."

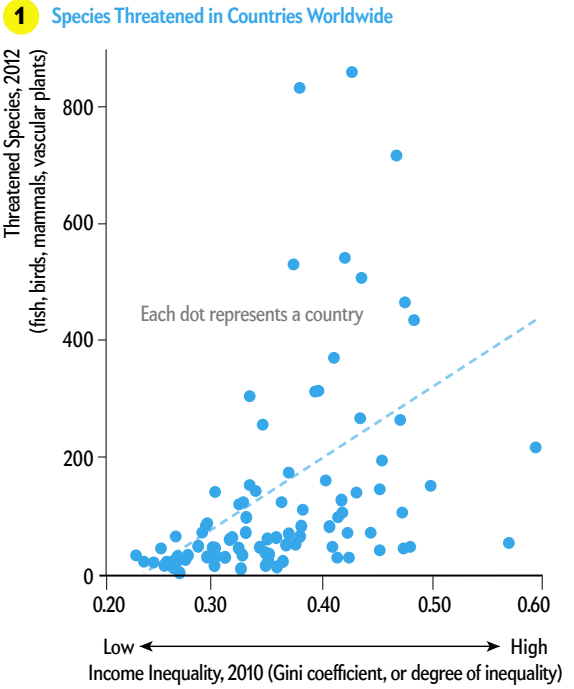
When the people who could be harmed have little or no political power, decision makers can minimize or ignore the costs. An extreme example is the cost-benefit case the U.S. Environmental Protection Agency made under the Trump administration for repealing the Clean Power Plan. It assigned a value of zero to all climate impacts outside the U.S., reasoning that harms to people not in the country should not be considered in the making of U.S. climate policy.

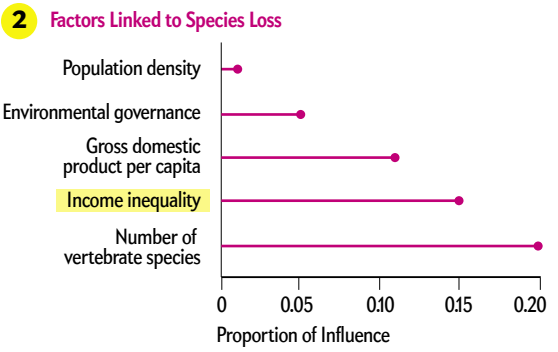
Purchasing power and political power tend to be correlated: those with more dollars often have more political influence, and vice versa. Their joint effect can be described by a concept I call the power-weighted social decision rule. It means that the weight assigned to the costs and benefits from environmentally degrading activities depends on the power of the people to whom those accrue. When those who benefit from environmentally degrading activities are wealthy and powerful, compared with those who are harmed, social decisions favor the winners over the losers. The greater the inequality between rich and poor and between the more powerful and the less powerful, the greater the extent of environmental degradation.

Power inequality also exacerbates the neglect of future generations and lack of knowledge about environmental costs. When inequalities are wide, the imperatives of day-to-day survival for the very poor may overshadow worries about tomorrow; among the very

MORE INEQUALITY, FEWER SPECIES

Many studies show that as the gap between rich and poor people widens, the extent of environmental damage increases. For example, one analysis found that countries with higher income inequality also have higher rates of species classified as threatened by the International Union for Conservation of Nature (1). A separate report determined that income inequality is more strongly correlated with species loss than other major factors such as population density and even environmental policies (2). Only the total number of species had greater influence.





Sources: "Inequality and Environmental Sustainability," by S. Nazrul Islam. United Nations Department of Economic and Social Affairs Working Paper No. 145. United Nations, August 2015 (*number of species threatened*); "A Cross-National Analysis of How Economic Inequality Predicts Biodiversity Loss," by Tim G. Holland, Garry D. Peterson and Andrew Gonzalez, in *Conservation Biology*, Vol. 23, No. 5, October 2009 (*factors linked to species loss*)

Graphics by Jen Christiansen

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OBJECTION to the Dakota Access Pipeline in North Dakota by local Native Americans concerned about contaminated water supplies grew to a larger protest nationwide against corporations and politicians having more power than underserved communities.

rich, fear that their sway will eventually end can foster a cut-and-run attitude toward natural resources (exemplified by the rapacious deforestation of Southeast Asia in the 1960s and 1970s under such dictators as the Philippines' Ferdinand Marcos and Indonesia's Suharto). And when inequalities are wide, the poor are more likely to lack access to information, including about the nature and causes of the environmental harms to which they are subjected.

HEADS I WIN, TAILS YOU LOSE

THE POWER-WEIGHTED social decision rule predicts not only that greater inequality will lead to greater environmental harm but also that the harm will be concentrated in communities at the lower end of the wealth-and-power spectrum. In those places, environmental costs carry less weight in the eyes of decision makers. Racial and ethnic minorities and low-income communities are at greatest risk. The Standing Rock reservation, where 40 percent of residents fall below the federal poverty line (triple the national rate), was vulnerable on both counts.

At the same time, the benefits from environmentally degrading activities—higher profits for producers and lower prices for consumers—are concentrated at the upper end of the economic spectrum. Profits flow to shareholders and corporate executives, who generally are relatively well off. And the more that consumers spend, the more they benefit from lower prices, again bestowing greater benefits on the well-to-do.

This is not to say that affluent people do not want a clean and safe environment. But to a substantial extent, environmental quality is what economists call an impure public good. It is not equally available to everyone. Well-off people can afford to live in cleaner places, buy bottled water and air conditioners, and get better medical care. They can also more effectively oppose having environmental hazards placed in their neighborhoods. By being further removed from environmental harms, they can more easily afford to ignore them. Even when they cannot altogether escape the consequences of environmental degradation, they weigh a relatively small share of the costs against a relatively large share of the benefits.

ENVIRONMENTAL INJUSTICE

SINCE THE 1980S researchers have systematically documented the disproportionate exposure of racial and ethnic minorities and low-income communities to environmental hazards in the U.S. One of the earliest studies, by sociologist Robert Bullard, examined the spatial distribution of hazardous-waste sites in Houston and found them to be located primarily in Black neighborhoods.

Subsequent studies have revealed similar patterns in many parts of the country: race and ethnicity correlate strongly with proximity and exposure to environmental harms. In multivariate analyses, race and ethnicity turn out to be even stronger predictors of pollution exposure than low income, testifying to the enduring salience of racism in the distribution of power in the U.S. The most hard-hit communities are often those where disadvantages of race and class intersect.

Researchers have also investigated how the correlations can be explained. One controversy that arose was about timing: Are hazardous facilities sited from the outset in communities with less wealth and power? Or, after a facility is sited, do wealthier residents move out, property values decline and poorer people move in? Few studies have explored this question directly, but those that do have found strong evidence that such toxic facilities are sited from the start in communities with less power. The evidence also indicates that in cases where more well-to-do people leave after a facility is built, the trend had already begun

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before the siting, suggesting that communities in transition are more vulnerable to having environmental hazards imposed on them.

Disproportionate pollution exposure hurts children in particular, resulting in higher rates of infant mortality, lower birth weights, a higher incidence of neurodevelopmental disabilities, more frequent and intense asthma attacks, and lower school test scores. Among adults, exposure is linked to work days lost to illnesses and the need to care for sick children. Over time these health effects reinforce the disparities that make communities more vulnerable to environmental harm in the first place.

Although the effects are most severe for at-risk communities, they often spill over to wider populations. For example, U.S. metropolitan areas with more residential segregation along racial and ethnic lines tend to have higher cancer risks from air pollution for everyone, not only for people of color. In cities that rank in the top 5 percent nationally for racial and ethnic disparities in industrial air pollution exposure, the average exposure for non-Hispanic whites is significantly higher than in those where pollution disparities are smaller. Environmental justice is good for everyone.

Environmental inequalities can be found everywhere. In England and the Netherlands, poorer and more nonwhite neighborhoods have higher air concentrations of particulate matter and nitrogen oxides, which aggravate respiratory problems. In Delhi, whose residents breathe some of the world's dirtiest air, the poor live in some of the most polluted neighborhoods. They also spend more time working outdoors, including along roadways, where air pollution loads are most extreme. They cannot afford air conditioning or air purifiers. At the same time, they obtain fewer benefits from the power generation, transportation and other industries that cause the pollution.

The power-weighted social decision rule operates at the international scale, too. Environmental harm is unduly inflicted on the poorest countries. In a 1991 memorandum, Lawrence Summers, then chief economist at the World Bank, wrote that "the economic logic behind dumping a load of toxic waste in the lowest-wage country is impeccable" because the foregone earnings from illnesses and deaths there will be lowest. His statement may have been tongue-in-cheek, but environmental practice often follows this script. Every year millions of tons of toxic waste are shipped from advanced industrial countries to low-income nations in Africa, Asia and Latin America.

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, an international environmental agreement that took effect in 1992, has proved inadequate to halt this flow. The distance between people who benefit from the economic activities that generate the waste and those who bear the costs of its disposal gives a painful new twist to the adage "out of sight, out of mind."

THE NEW ENVIRONMENTALISM

SO WHAT CAN WE DO to lessen social and environmental inequality, thereby reducing harm to people and the planet?

The relation between inequality and the environment is a two-way street. Reducing inequality in the distribution of wealth and power helps to bring about a greener environment. And efforts to advance the right to a clean and safe environment help to bring about greater equality. The key to both is active mobilization for change.

U.S. environmentalism in the 20th century aimed to protect nature from people. Enlightened elites often saw themselves as defenders of nature from the irresponsible masses. From there it was a short step to assume an inexorable trade-off between environmental protection and broad-based economic well-being.

WHEN PEOPLE WHO COULD BENEFIT FROM USING OR ABUSING THE ENVIRONMENT ARE ECONOMICALLY AND POLITICALLY MORE POWERFUL THAN THOSE WHO COULD BE HARMED, THE IMBALANCE FACILITATES ENVIRONMENTAL DEGRADATION.

In the 21st century we are witnessing the ascendance of a new environmentalism. The aim is to protect individuals who face harm from people who profit from degradation. The balance of power between these two sides can and does change over time. When climate activists from across the country joined Native Americans at Standing Rock, defending their right to a clean and safe environment, the power-balance scales began to move. The protesters, building on past achievements of movements across the country for equal rights and environmental protection, again came close to halting a multibillion-dollar enterprise in 2020, when a federal judge ordered the Army Corp of Engineers to undertake a new environmental review of the pipeline.

Similarly, in Washington State, activists succeeded in blocking a proposed coal export terminal that would have been the largest in the country, protecting lands and waters of tribal communities. In Montana, the Blackfeet Nation won the cancellation of energy leases on 23,000 acres, the culmination of a 30-year struggle.

The intimate links between inequality and the environment have led to growing recognition that if we want to rebalance human relationships with nature, we also need to rebalance our relationships with one another. SA

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TOXIC INEQUALITY

A trend of disproportionate exposure to deadly air pollution among Asian, Hispanic and Black people persists in most cases regardless of the emission source, a study finds

By Robin Lloyd

COMMUNITIES OF COLOR IN THE U.S. HAVE LONG REPORTED health problems from heavy exposure to polluted air. In recent decades a growing body of data have bolstered these reports by showing that Asian, Black and Hispanic people are exposed to relatively higher concentrations of potentially deadly air pollution on average, compared with white people. But some policy makers have questioned whether these trends hold across sources of such pollution—which can vary regionally and range from tailpipe exhaust on highways to emissions related to construction or commercial cooking.

A new study erases a great deal of any doubt that might have existed about racial and ethnic disparities in exposure to air pollution emitted from a variety of sources. The paper reveals that the same exposure disadvantages for people of color collectively persist across 12 of 14 groups of emission sources that spew a particularly dangerous type of air pollution: fine particles with a diameter of 2.5 microns or smaller, known as PM2.5. They are small enough to carry hundreds of chemicals deep into the lungs, where they cause respiratory and heart disease. Fine-particle air pollution is one of the largest environmental causes of death globally, according to a 2020 analysis by the Institute for Health Metrics and Evaluation at the University of Washington. And sources cited by the new study show that exposure to such pollution causes between 85,000 and 200,000 premature deaths in the U.S. annually.

AIR POLLUTION disproportionately affects people of color across the vast majority of emission sources, including industry, gas- and diesel-fueled motor vehicles, and construction, according to new findings.

Mark Wilson *Getty Images*

The air pollution impact on each racial or ethnic minority group—Black, Hispanic and Asian people—persisted even when the researchers controlled for the state in which people resided or for whether they lived in an urban or rural region. And the disproportionate pollution impact held among people of color as a group regardless of household income.

The researchers also break down the relative source-exposure trends for each minority group, compared with those for white people. Hispanic and Asian people are exposed to higher-than-average concentrations of fine-particle emissions from most of the types of sources than white people, the analysis shows. For Black people, the exposure disadvantage holds across all 14 groups of emission sources. The results were published in April 2021 in *Science Advances*.

"When we started this project, we were thinking that we would see what the main sources of air pollution are behind this injustice—and then we could say, 'We can fix those and solve this problem,'" says study leader Christopher W. Tessum, an environmental

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engineer at the University of Illinois at Urbana-Champaign. "What we found instead is that it's actually almost all of the source types of air pollution that are causing the disparity. It's really just everything that's stacked against people of color and exposing them more to air pollution."

Fine-particle pollution emissions from construction, motor vehicles and industrial sources are often among the largest disparities in average exposures of ethnic and racial minority groups, compared with exposures of white people, the team found.

The results are not surprising, says environmental engineer and environmental justice researcher Regan Patterson, who was not involved in the study. But they are significant for the role they can play in substantiating the experiences of the Black community and other communities of color with air pollution and its ill effects—particularly when community members and advocacy groups give testimony about environmental impacts at public hearings or push for policy changes.

"A lot of community organizers have been doing this work; however, it's important to have the data because it is often stated that if there's no data, it doesn't exist," says Patterson, a transportation equity research fellow at the Congressional Black Caucus Foundation.

To estimate the fine-particle pollution sources' impact on racial and ethnic groups, the team started with 2014 data from the Environmental Protection Agency's National Emissions Inventory. The researchers ran a computer model to trace the average concentrations of fine-particulate matter emissions caused by more than 5,400 types of pollution sources, yielding exposure levels affecting regions at the level of neighborhood blocks. The sources were grouped into 14 types of emitters, and the concentrations were mapped to racial and ethnic self-identification data from the U.S. Census.

Tessum says the new findings point to a problem inherent in clean-air policies that have successfully reduced air pollution nationwide in recent decades: such strategies will not eliminate the extra air pollution and associated health risks experienced by people of color.

And the strength of the racial and ethnic trends across the dozen or more groups of emission sources suggests that solutions to these air pollution disadvantages are not as simple as targeting a single industry or eliminating certain types of industrial steam boilers or other equipment. "What popped out to us was just how pervasive the problem was," says University of Minnesota biosystems engineer Jason Hill, a co-author of the new paper. "It's systemic. I'm not going to beat around the bush: this is the product of a long history of racism in this country."

Patterson says efforts to reduce air pollution should target and benefit disproportionately affected communities and should address inequities that persist despite existing national or broad-stroke regulations.

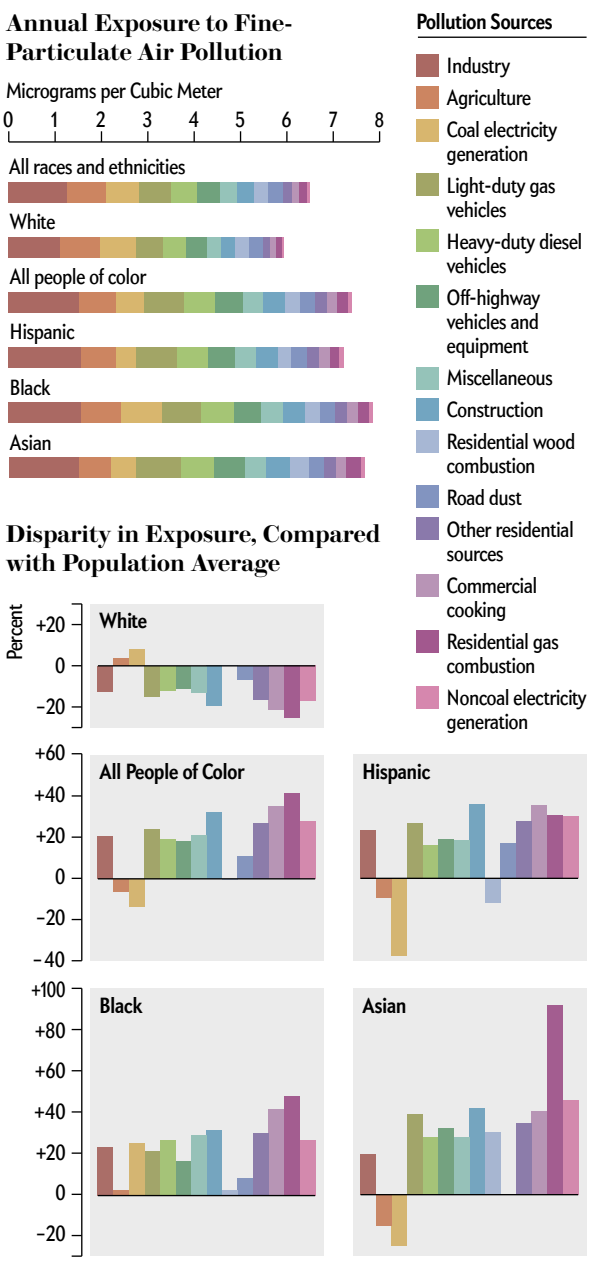
To eliminate the air pollution burden on people of color and the larger consequences it has for society, Tessum says policy makers should also ensure that discussions of regulatory remedies are primarily guided by the experiences, needs and hard-won expertise of the affected communities—and by organizations that advocate for those who are most affected. SA

Robin Lloyd is a science writer based in New York City and a contributing editor at *Scientific American*.

Source: "PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States," by Christopher W. Tessum et al., in *Science Advances*. Published online April 28, 2021

Systemic Racism Is in the Air

In the U.S., Black, Hispanic and Asian individuals, as well as people of color as a group, are exposed to higher levels of fine-particulate matter, on average, than white individuals across the majority of emission sources. The sectors of the economy that emit absolute pollution levels with the highest disparities that disadvantage people of color include construction, motor vehicles and industry. In the data shown here, those identified as Hispanic may be of any race, and all other groups are non-Hispanic. The category "all people of color" includes all races and ethnicities except for non-Hispanic white.



Graphic by Amanda Montañez

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GRID Alternative's Frank Ross *(left)* works with trainees from the Rising Sun Energy Center to install solar panels on a roof in Richmond, Calif., in May 2015.

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SOLAR POWER'S UNEQUAL SHINE

Racial and ethnic minorities have less access to solar energy, regardless of income, highlighting the need for environmental justice

By Jeremy Hsu

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HIGHLAND PARK'S STREETLIGHTS WERE TORN OUT IN 2011 because the predominantly Black Detroit suburb couldn't pay its electricity bill after the 2008 economic recession. Today a growing number of street lamps once again cast reassuring pools of light—and this time they are cheaper because they harvest the energy of the sun. Highland Park offers an example of what environmental justice advocates hope to do more of to bring affordable, clean energy to communities of color.

Plummeting costs have helped solar power rapidly expand in the past decade, with U.S. residential installation growing by more than 50 percent each year between 2010 and 2016. But access to this energy has not been equitable—and not just because up-front installation costs can price out people with lower incomes. A 2019 study indicates that even when income is taken out of the equation, communities of color have installed fewer rooftop solar facilities than predominantly white communities. The data are among the first to show such inequality in access to clean energy, a situation advocates have reported anecdotally for years. The results "affirm trends in disparity in adoption that are well known to practitioners but demonstrate their existence in a robust way," says Ben Sigrin, an energy systems modeling engineer at the National Renewable Energy Laboratory in Golden, Colo., who was not involved in the study.

Reasons for the disparity remain unclear, but the latest findings suggest programs aimed at boosting solar power in disadvantaged communities need to consider more than just income levels. Some activists and nonprofit organizations are already moving in this direction. For example, the civil rights group NAACP—inspired partly by local activists who formed a group called Soulardarity, which helped bring Highland Park its solar street lamps—launched a year-long 2018 Solar Equity Initiative aimed at improving solar energy access to marginalized communities, including racial and ethnic minorities. "To us, [energy] is just another dimension of social justice challenges," says Jacqueline Patterson, director of the NAACP's Environmental and Climate Justice Program. "With clean energy, not only is it often a more affordable way of accessing energy, but it also puts us in control of our energy."

SOLAR DISPARITIES

RESEARCHERS at the University of California, Berkeley, saw a golden opportunity to study imbalances in solar power deployment through their access to data from Google's Project Sunroof—an initiative that maps solar rooftop panels seen in satellite images—and demographic data from the U.S. Census. They had an inkling of possible racial and ethnic disparities but initially thought other socioeconomic factors could help explain many of them. Yet their study results, published in January 2019 in *Nature Sustainability,* showed that even when controlling for income levels, neighborhoods with either Black or Hispanic majority populations have installed fewer rooftop solar panels than neighborhoods with no clear racial or ethnic majority. White-majority neighborhoods, in stark contrast, have more rooftop solar installations than those without a clear majority. The researchers say these differences cannot be completely explained by either household income or home ownership levels (homeowners are more likely than renters to invest in permanent solar panels). "I was not surprised to see that race and ethnicity were important, but once we controlled for income, I thought the effect would be reduced significantly," says Daniel Kammen, director of the Renewable and Appro-

Michael Macor *Getty Images (preceding pages)*

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priate Energy Laboratory at U.C. Berkeley and a co-author on the study. "But alas, it was not."

The study did not uncover the root of why rooftop solar panels are typically sparser in Black and Hispanic neighborhoods. But the findings mesh with reports from industry and nongovernmental organizations, which have previously shown that a lack of diversity in the environmental and solar power fields has hindered efforts to spread solar power's benefits. Causal factors may connect to the well-documented historical pattern of racial discrimination that has left many minority neighborhoods in the U.S. stuck with problems such as insufficient public infrastructure and predatory home loans. "The disparity in rooftop solar is the same disparity as in everything else," says Naomi Davis, founder and president of the Chicago-based nonprofit organization Blacks in Green.

The study also adds to the body of research showing that Black and Hispanic Americans bear the brunt of the costs of fossil-fuel use. For one thing, they are exposed to higher levels of air pollution than white Americans—regardless of income levels. There are more direct economic effects as well. "This paper does highlight an energy injustice," says Deborah Sunter, assistant professor of mechanical engineering at Tufts University and co-author of the rooftop solar study, "because there are certain communities that are missing out on the financial benefits that come with having rooftop solar: the tax incentives, the rebates, the profit from net metering." (The last benefit refers to credits received in exchange for putting excess solar power into the electricity grid.)

SHIFTING STRATEGIES

THERE IS ALREADY a movement among community activists, researchers and politicians to promote social justice in policies designed to support clean energy and fight climate change. "There is tons of leadership in communities of color that is not seen or acknowledged, and it's growing," says Julian Foley, former vice president of communications at GRID Alternatives, a nonprofit organization based in Oakland, Calif., that helps disadvantaged communities install solar projects. The study's results could help fine-tune such efforts by underlining the need to shift strategies from focusing only on low-income communities—because that approach may not catch neighborhoods where ethnic minorities predominate. Kammen says policy makers could, for example, recognize how credit scores have been used to discriminate in home loans on the basis of race—and could apply "positive pressure" by offering bonuses to loan seekers who add rooftop solar panels or other energy-efficiency measures.

Officials also need to be aware of how small changes in policy can have indirect but significant impacts on programs aimed at bolstering solar power in disadvantaged communities. For example, the Bishop Paiute Tribe has used both federal energy grants and California state funding for rooftop solar projects, which can slash monthly utility bills by up to 75 percent. But starting in 2020, new California rules that define disadvantaged communities according to U.S. Census tracts disproportionately affected by pollution initially left tribal lands out of the picture. Even alternative proposals that suggested including low-income census tracts risked excluding tribal communities. "A lot of tribes are smaller than census tracts, so the income base gets diluted by surrounding communities" under the new rules, says Brian Adkins, environmental director at the Bishop Paiute Tribe Environmental Management Office.

EVEN WHEN INCOME IS TAKEN OUT OF THE EQUATION, COMMUNITIES OF COLOR HAVE INSTALLED FEWER ROOFTOP SOLAR FACILITIES THAN PREDOMINANTLY WHITE COMMUNITIES.

Fortunately, the Bishop Paiute Tribe worked with many other tribes and GRID Alternatives—the statewide program administrator for California's solar power incentives program—to help convince state regulators to specifically make tribes eligible under the new program. By the end of 2020 the tribe had installed 546 kilowatts of rooftop solar capacity across 163 single-family homes with the help of state funding provided over the past decade.

The researchers behind the U.C. Berkeley study also hope it can encourage leaders to support environmental justice for historically disadvantaged communities—and to recognize more diverse voices on such matters. "The environmental movement in the U.S. has an overwhelming amount of white leadership, and even if many of those groups are doing great things, that doesn't speak toward a very inclusive effort," Kammen says.

The advocacy work done by Davis, the Chicago nonprofit leader, has helped shape state legislation aimed at increasing renewable energy in Illinois. She has also secured funding for solar job training and has set up a social enterprise program in hopes of establishing a solar panel assembly plant in Chicago's predominantly Black Woodlawn neighborhood. Davis sees solar power as just one small piece of a bigger holistic approach to building sustainable neighborhoods, but she wants to make sure Black communities are not left out of the economic transition to clean energy in the U.S. "Step back and create partnerships where money flows directly to frontline environmental justice community-based organizations," Davis says. "And then depend on those organizations to write the story." SA

Jeremy Hsu is a New York City–based writer who has contributed to publications such as *Scientific American, IEEE Spectrum, Undark Magazine* and *Wired*.

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Biases Aren't Forever

Implicit prejudice against certain groups is declining *By Matthew Hutson*

Psychologists have lots of evidence that implicit social biases—our automatic, knee-jerk attitudes associated with specific races, sexes and other categories—are widespread, and many assumed they do not evolve. The feelings are just too deep. But a recent study finds that over roughly the past decade, both implicit and explicit, or conscious, attitudes toward several social groups have grown warmer.

The study used data from a standard test of implicit attitudes collected via a Web site called Project Implicit. Participants were asked to quickly press a certain computer key in response to positive words, such as "happy," and a different key in response to negative words, such as "tragic," that appeared on a screen. These words were interspersed with images or words that represented two categories of people, such as Black and white, and participants were asked to flag these using the same keys. Faster reactions when, for example, Black rather than white faces shared a key with negative words suggested a racial bias.

Tessa E. S. Charlesworth and Mahzarin R. Banaji, psychologists at Harvard University, analyzed more than four million results collected over a 10-year period from U.S. adults who had taken implicit association tests for sexuality, race, skin tone (in which faces differ in color but not shape), age, disability and body weight. Respondents also answered questions on the screen asking them to explicitly rate how much they liked people in each of the categories.

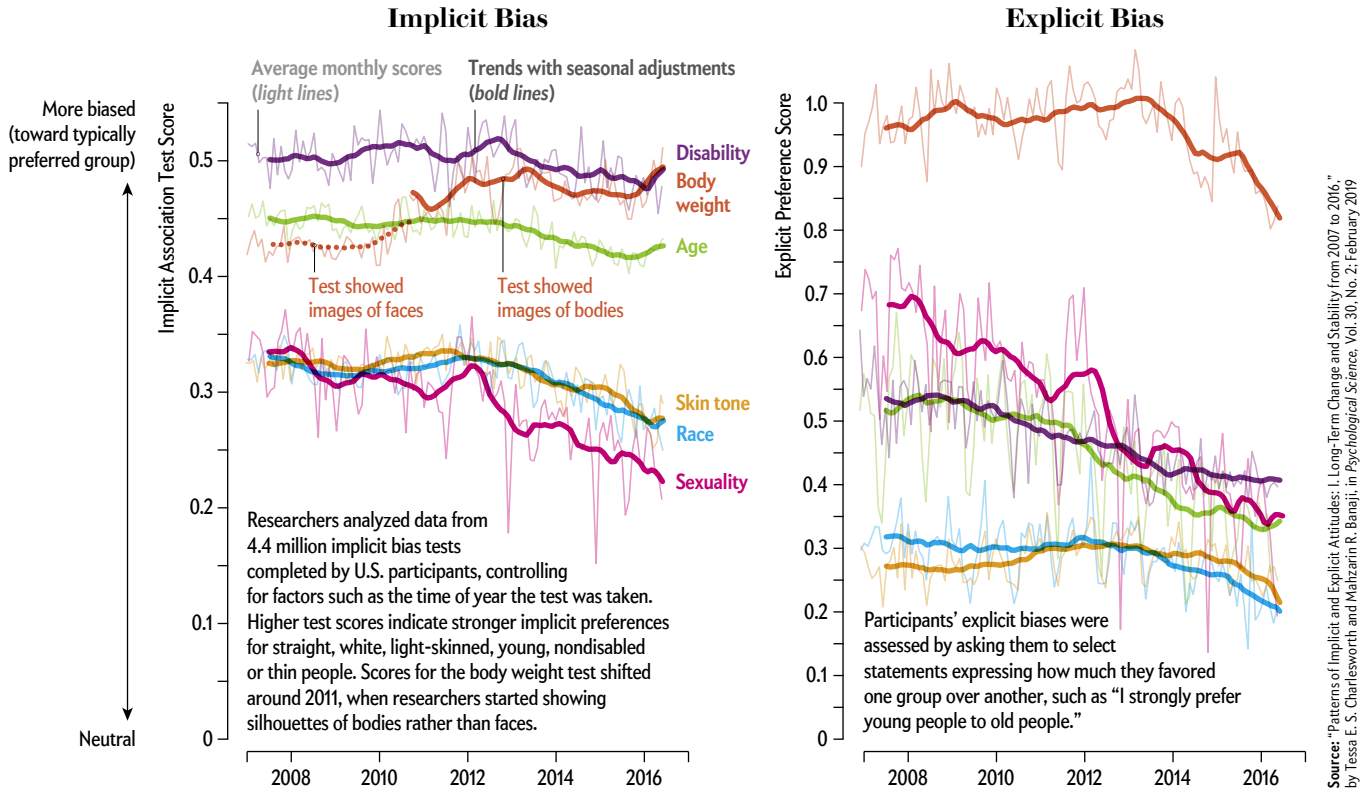
In line with previous findings, explicit bias decreased in all six categories from 2007 through 2016; the drop ranged from 49 percent (for sexuality) to 15 percent (for body weight). But more surprisingly, implicit bias also decreased—by 33 percent for sexuality, 17 percent for race and 15 percent for skin tone (*graphic*). Most of the reductions occurred in all generations, the researchers reported in a study published online in early 2019 in *Psychological Science*. "It's a really cool paper," says Keith Payne, a psychologist at the University of North Carolina at Chapel Hill, who has found similar bias reductions in his own work. "I think it's going to start a lot of conversations."

Charlesworth and Banaji also found, however, that implicit biases about age and disability did not change over time, and those against overweight people nudged up by 5 percent.

Several factors might explain the discrepancies among categories, the researchers say. In their data set, implicit biases for race, skin tone and sexuality were lower to begin with than those for age, disability and body weight. And the types of implicit biases that decreased the most are also the biases that have received more societal attention. Meanwhile the stigma associated with obesity may have increased in recent years.

Next the team plans to explore implicit and explicit attitude change across demographics and geographical regions, as well as whether there is evidence that trends are related to political polarization. SA

Matthew Hutson is a freelance science writer based in New York City and author of *The 7 Laws of Magical Thinking*.



Source: "Patterns of Implicit and Explicit Attitudes: I. Long-Term Change and Stability from 2007 to 2016," by Tessa E. S. Charlesworth and Mahzarin R. Banaji; in *Psychological Science*, Vol. 30, No. 2: February 2019

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